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NEW YORK, August 13, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In your issue of July 16, you kindly printed my communication giving some experiences while in Europe. An error appears in the name of Mr. J. G. Hawkins, it being printed J. G. Harvey. I presume the mistake was due to my haste in dictation and omission to read copy.

Mr. Hawkins is the well-known engineer of the Wigan Gas Works, and the inventor of the process for the revivification of oxide of iron *in situ*. By making this correction you will oblige,

Truly yours, GEO. SHEPARD PAGE.

[OFFICIAL NOTICE.]

Sixteenth Annual Meeting, American Gas Light Association.

OFFICE OF THE SECRETARY, August 11, 1888.

To the Members of the Association:—Gentlemen: As already announced, the Sixteenth Annual Meeting of the Association will be held in the city of Toronto, Canada, on Wednesday, Thursday and Friday, October 17, 18 and 19, and the present indications are that the gathering will be eminently successful.

The following papers are promised, their titles together with the names of the authors constitute a most worthy nucleus for the programme of the literary portion of the convention:

"Experience in Distributing Gas Under Extremely Low Temperatures," by D. H. Geggie. "Observations During Many Years' Experience in the Gas Business," by James R. Smedberg. "Construction of Gasholders with Wrought Iron or Steel Tanks above Ground," by Frederick Mayer. "The Steam Stoker and Improved Charger," by A. Q. Ross. "Daily Experiences and Observations of a Gas Manager," by James Somerville. "Coals for Gas Making," by Jas. D. Perkins. As will thus appear, we have six good papers already promised; but we will need several more in order to fill in nicely the time which we will have at our disposal. I trust the members will not be backward in filling in the gap. I would also say that if a member knows of another of his coworkers who has been engaged in work of special interest, and will communicate with the Secretary, an effort will be made to induce the party to give to the Association, in the form of a paper, an account of this special work.

I would repeat what I have said in former years in regard to the Question-Box—namely, if this adjunct to our meetings is to be used to advantage members should send in to the Secretary their questions at an early date, in order that mention may be made of them in a subsequent circular, thus giving the members an opportunity to come to the meeting prepared to answer the conundrums.

It may be well to remind the members—as I did more particularly under date of April 25th—of the prize which will be offered at the coming meeting for the best paper on "Naphthaline." The amount of the prize is $25.

In regard to the further details of the meeting, such as hotel arrangements, etc., I cannot at present speak definitely, owing to the absence of the Chairman of the Committee of Arrangements; but I hope later in the month to enlighten the members in regard to the details of the meeting. In conclusion, let me remind the members that the coming meeting will be the first one held by the Association in Canada. All who attend the convention will be sure of having a profitable and enjoyable time, and I trust the members will commence at once to so make their plans as to insure their attendance at Toronto next October.

Respectfully,

LAWRENCE, MASS. C. J. R. HUMPHREYS, Secy.

BRIEFLY TOLD.

Secretary Humphreys' reminder that the date for the Toronto convention of the American Association is not so far away on the calendar is,

as usual, timely and interesting, and the members no doubt are all aware that at this meeting will be decided a matter which cannot fail of being of importance to them, since during the sessions they will be called on to either adopt or reject a new constitution, as also a set of subsidiary rules for the Association's government and conduct. As these were given in full in our report of the proceedings of the last annual meeting it is unnecessary at this time to repeat them here; and we can but express the hope that the proposed governmental code has been carefully studied by those who will be directly concerned in its future application and construction. Certainly, sufficient time has been allowed for a proper study of the acts; therefore, if the proposed rules shall be adopted, those who may feel uncomfortable under the future working of some of the clauses cannot seek relief from their oppression in the thought that they cast their affirmative votes unknowingly. Some of the members seemed to fear last fall when Toronto was named as the next gathering place that October and Toronto would prove to be a chilling combination; but this fear ought not to be allowed to count for much, because one and all can count on a most warmly hospitable reception from Mr. Pearson and his associates in the management of the Consumers Gas Company. There, too, protectionists and tariff reformers, standing on neutral ground, may take a brief respite from the political struggle that will then be waxing rather warm in the States. The Secretary puts it rather mildly in remarking that his promised literary contributions constitute a most worthy nucleus for the mental entertainment of the members. In our opinion, if this is but the nucleus, the Association is threatened with an embarrassment of riches—six papers, each by a specialist who is to deal with his specialty. However, the assignment Committee, we suppose, are to be credited with the result thus far achieved, and they must certainly be adepts in the art of persuasion when they succeeded in inducing Messrs. Perkins and Somerville—to say nothing of the others—to enter the contributor's field. It is a great list, and we look forward to the result with great expectation. The prize to be competed for we hope will receive recognition, as it is the offering of a Scotch engineer, who asserts that gas engineers are not to be distinguished on the score of nationality. So far it would seem as if the Canadian invasion is to form a notable epoch in the history of the Association.

Mr. J. H. Farrish, Secretary and Treasurer of the St. Joseph (Mo.) Gas and Manufacturing Company, writes us that on July 1st the following schedule became operative:

Monthly Consumption.	Net Rate.
100,000 cubic feet and upwards	$1.37
30,000 to 100,000	1.50
10,000 to 30,000	1.62
1,000 to 10,000	1.75
Less than 1,000	1.87

All gas used for domestic or power purposes is to be supplied at $1.25 per M. Verily, Mr. Farrish and his associates propose to remain in the front rank.

An Advance at Mount Vernon, N. Y.—Mr. Nettleton, Sr., who bears his years with the dignity of a true veteran, and whose interest in the gas business is fully as keen as when he so satisfactorily performed the duties pertaining to the office of the Secretary of the American Gas Light Association, has vanquished the philanthropists who sought to obtain a franchise for an opposition company in Mount Vernon. How Mr. Moses R. Crow and his associates can expect to receive an affirmative from the Village Trustees in respect to their application for a franchise to operate a gas works in the district which has for such a lengthy period been so plentifully (both in the matter of quantity and quality) supplied with cheap gas by Mr. Nettleton's Company, quite passes our comprehension. Since no complaint has been made by individual residents against the old Company's service, we must, in looking about for a moving cause for the Crow application, indulge in speculation. Can it be that the local electricians, who would not require a very great amount of argument to induce them to part with their property to the Eastchester Gas Light Company, failing to find a market for their wares, wish to hurry up matters (it is a notorious fact that the Mount Vernon electricians are not adding largely to their bank accounts from their profits in that enterprise) in the way of a trade? If this is so they cannot be very well acquainted with Mr. Nettleton, who, while open to argument, is not the sort of person upon whom bullying tactics can be successfully brought to bear. At a meeting of the Eastchester Gas Light Company's Directors held last March it was determined, when the improvements then ordered had been completed, to reduce the selling rates, and this promise is now about to be redeemed. A circular recently issued contains the announcement that on and after Oct. 1, (on which date we presume the new holder and extensions to the mains sytem can be availed of) all consumers who use 500 cubic feet and upward per month are to have gas at the rate of $1.60 per thousand. This is on a par with the price charged in that portion of the city of New York north of the Harlem river, and over the city of Brooklyn as well. That the Mt. Vernon rate is cheaper than either our suburban or the Brooklyn figure requires no argument. It proves itself. In conclusion we have to further congratulate the Company and its managers on the renewal of the contract with the Trustees for the lighting of the village gas lamps. The contract, which ends on June 30th, 1889, is made on the basis of $23 per post.

How a "Yankee" Supplied a Western City with Gas for Seven Days without the Aid of a Gasholder.

In order that the position in which I was placed, when I took charge at Monmouth, Ills., may be fully appreciated, I will, in as few words as possible, describe the works as I found them.

Those of the fraternity who have seen the style of works built in some small Eastern towns, say, 40 or 50 years ago, can appreciate the situation.

There was nothing modern about the Monmouth plant save clay retorts and a dry center valve. A gate served for inlet and outlet pipes, a ¾-inch bye-pass, and the holder, which was rated to hold 14,000 cubic feet, could only be utilized to the amount of 8,000 cubic feet. The first step taken was to authorize the Kerr Murray Manufacturing Company to build a holder outside the tank, subsequently removing the old one and replacing it (in the same tank) with the new one—they agreed to make the substitution in 48 hours after the new holder was completed.

Being somewhat doubtful of the contractor's ability to accomplish this substitution within the specified time, because of the condition of the old holder, we were obliged to contrive a way to keep up the supply of gas to the city during the period of time it might take to make the required change. With this object in view we put in a 6-inch bye-pass around the holder, but as our retorts were decidedly old and very weak, and since we dared not subject them to over 45-tenths pressure, we put in what we termed a "safety valve," which was constructed in this way. Having determined that the pipe leading from the hydraulic main had been tapped for 1 inch, and as we had no 1¼-inch drill and tap, we connected a 1¼-inch pipe to the 1 inch pipe, carried it outside the works and sealed in an ordinary barrel filled with water, arranging it so that it would blow off at 45-tenths pressure.

Now, as to the result of our experiment. From July 6th to July 13th (inclusive) we supplied our ordinary consumers, and the town as well, with gas delivered directly from the works, or without the intervention or assistance of a holder. The quantity distributed varied from 7,000 to 15,000 cubic feet per day. This was accomplished at only a slight variation from our usual rate of pressure—27-tenths (see appended record of pressure for 24 hours, the rate of which was taken every half hour.)

The supply was kept up without any inconvenience to our consumers in fact they would not have known that any change from our regular method had been made, had we not notified them of it beforehand. We, therefore, claim to have demonstrated the fact that a gas company can supply its consumers, if it is ever so unfortunately circumstanced as to be cut off from the use of its holder, provided the company is possessed of sufficient carbonizing capacity to produce the gas as fast as it is called for.

Hoping the above statement may be of some benefit to my gas friends who live in the "windy region," and hence are liable to lose a holder, and also to my Eastern friends, who sometimes find their holder leads stopped with naphthaline, I am

Yours,
L. P. Gerould,
Manager Monmouth (Ills.) Gas Co.

Record of Pressure in 24 Hours During the Experiment.

12 M.	30-tenths.	8:30 P.M.	27-tenths.	4:30 A.M.	40-tenths.
12:30 P.M.	27 "	9 "	20 "	5 "	35 "
1 "	20 "	9:30 "	20 "	5:30 "	20 "
1:30 "	27 "	10 "	30 "	6 "	34 "
2 "	32 "	10:30 "	21 "	6:30 "	25 "
2:30 "	29 "	11 "	18 "	7 "	34 "
3 "	23 "	11:30 "	27 "	7:30 "	27 "
3:30 "	15 "	12 M.	22 "	8 "	18 "
4 "	27 "	12:30 A.M.	20 "	8:30 "	22 "
4:30 "	19 "	1 "	22 "	9 "	25 "
5 "	34 "	1:30 "	22 "	9:30 "	30 "
5:30 "	36 "	2 "	28 "	10 "	27 "
6 "	25 "	2:30 "	22 "	10:30 "	18 "
6:30 "	18 "	3 "	16 "	11 "	30 "
7 "	23 "	3:30 "	20 "	11:30 "	25 "
7:30 "	20 "	4 "	30 "	12 M.	28 "
8 "	20 "				

The Principles of Gaseous Firing Considered in their Application to the Heating of Retorts.

By Charles C. Carpenter, C.E.

[A paper read at the last meeting of the Gas Institute. Reprinted from the London *Journal*.]

In November, 1886, the author had the honor of reading before the Southern District Association of Gas Managers a paper on retort furnaces, wherein were set forth, under two clearly defined heads, certain views held by him upon the subject, as well as his experimental justification for them. Into what may be termed the controversial aspect of this question it is not now the author's intention of entering. But as the present is the first meeting in London of the Gas Institute since the publication of that paper, he conceived that some further reference to so important and vital a subject, especially with regard to the system then described of gaseous firing *per se*, and which has since made such rapid strides, might be of interest—nay, more, of value—to the members attending that meeting, supplemented as it is by the opportunity all will have of inspecting and examining for themselves its working at Vauxhall.

Before, however, proceeding to discuss this in detail, it will be well first to consider in what gaseous firing consists. This may be conveniently done under three heads, which may be stated as, first, the production from the coke of a combustible gas; second, the supply thereto of the heated air necessary for, last and not least, its proper and economic combustion in the setting.

An ideal gas-producer may be described as having the form of a stepped inverted cone; the primary air for gasifying the contained fuel being admitted through a small opening at the apex, where, by reason of its restricted area, intense combustion takes place—the carbonic acid being formed at the highest possible temperature, and which, as it makes its way upward through the rapidly increasing area of the fuel above, is reduced in its speed of travel to the extent necessary for the reaction of its complete conversion to carbonic oxide to take place. But in practice it is found that this form (the nearest approach to which is the Liegel and other allied types of slit furnaces) is open to two grave disadvantages—one being the intensity of the heat produced, and consequent destruction of the brickwork adjacent to the primary air intake; the other that the regular production of gas depends upon this slit being kept perfectly clear, since the obstruction caused by a small piece of slag or clinker bears a very large proportion to its total area. It may be stated in passing that the same holds good, though in a somewhat modified degree, with open-hearth producers; and this is one reason why the air regulation is much more easy, and therefore the production of gas more uniform (the attention required being also much less, limited as it is to clinkering at regular intervals), when, as in the closed grate, the air is admitted thereto after being previously regulated, instead of having unrestricted access to the varying area of the slit itself. The writer lately had an opportunity of inspecting the very excellent arrangement for

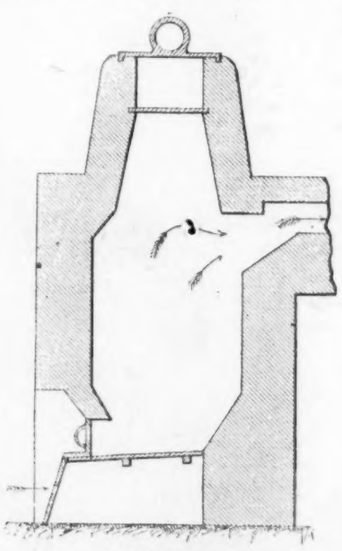

Fig. 1.—Bischof's Producer.

burning breeze adopted by Mr. A. F. Phillips, at the St. Albans Gas Works, and whose experience of the use of a slit furnace for this purpose is confirmatory of the necessity of keeping the opening continuously clear, though the furnace capacity is not so great, nor the labor in the case of breeze very heavy.

Leaving, therefore, our ideal type as impracticable for the reasons stated, probably as near an approach thereto as, broadly speaking, is possible, will be found in the original producer designed in 1839 by Bischof, and used by him for metallurgical purposes in the Hartz. Fig. 1 is a sectional elevation of this producer taken from a cut in a translation of Knapp's "Technology," published in England in 1855. It is cylindrical in plan, the lower portion tapering quickly toward the grate, which is a closed one, and to which the primary air enters through holes of the required area in the damper plate. The door above the bars gives access for clinkering, etc. At the upper part is a flue containing a damper, which is the exit for the combustible gases; the producer working under chimney draught. Above this conduit is formed a hopper, terminating in an opening covered by a door, and through which the fuel is fed on to a second and sliding door beneath. This door is withdrawn when the cover is replaced, thereby admitting the fuel required without waste of gas. As far as the general design *per se* of this producer is concerned, it would not be easy to improve upon it, minor points of detail of construction excepted; and it would indeed be difficult to show wherein it differs from others which have been made the subject of patents of more recent date.

More than 20 years after, the late Sir William Siemens brought out his well-known producer, and which the author has no hesitation in characterizing as inferior in design to the one just described. His system, indeed, doubtless owes its very wide application for obtaining, with

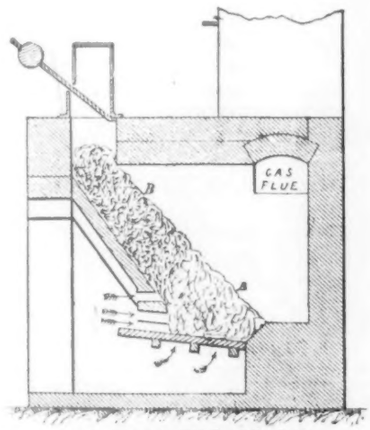

Fig. 2.—Siemens (Old Type) Producer.

great economy, the intense heats required for various melting operations, far more to its arrangements of regenerators and cooling tubes than to anything commendable in the producer itself. Fig. 2 is explanatory of this old type of Siemens producer. It is given by the author as a good example of what to avoid in designing producers using coke as fuel for heating retort settings in gas works; and he purposes devoting the more space to its description since it is to its adaptation for that purpose by engineers, both here and on the Continent, that probably more failures are due than to any other cause. It will be seen, on reference to the drawing, by examining the relative positions of the charging door and grate surface, that only a comparatively thin layer of fuel is possible thereon. Any irregularity, therefore, either in the charging or the consumption of the fuel, due to variations of draught and primary air supply, quickly disturbs the balance of action. The thinner the layer of fuel on the back of the bars becomes, the greater its tendency to burn away there at an ever increasing ratio. Free oxygen passes through it, burning upon its surface, and within the confines of the producer, the carbonic oxide formed there, and causes local and excessive heat destructive to the adjacent brickwork. It is, of course, clearly understood that the author is speaking of this producer as gasifying ordinary coke, and that, too, for heating a retort setting placed above it. When using coal, as was almost invariably done by its designer, the danger under this head would not, of course, be so great; but even under those circumstances a slow rate of combustion, and therefore a low draught, is essential for anything like success in working.

One other important disadvantage in this form of producer remains to be noticed—viz., the smallness of the proportion effective for gasification in comparison with its total bulk. The part colored red (*A*) in the diagram is self-explanatory of the direction taken by the gases from their

formation at the grate to their subsequent reduction by the superposed fuel; the portion of which contained above this area—shown in a blue tint, *B*—being in a semi smouldering state, producing gas of lower calorific value and temperature, and which either lowers, by mixing therewith, the total intensity of that produced at the lower and effective zone of action, or, as is more usually the case, is productive of another serious disadvantage which will now be considered, and with which most engineers using producers of this type (as distinct from the circular externally-placed Siemens *cum* Bischof pattern) are more or less familiar. Taking, for example, a through set of retorts fired from a self-contained producer at one end, an almost universal difficulty is to maintain the full temperature right up to the mouthpiece in the whole of the fronts of the retorts nearest thereto; while from their more central portions to their farther extremity they are equally and sufficiently heated.

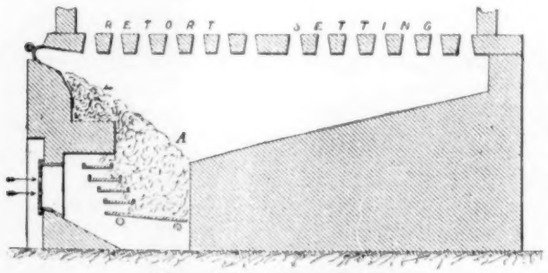

Fig. 3.—Modified Siemens Producer.

Fig. 3 is a section of a well-know furnace supplying a setting placed immediately above it, the arrangement and disposition of the grate being, as will be seen, based upon the Siemens pattern just described. The active zone of the producer is again colored red; and the gases rising therefrom occupy the greater length of the under side of the furnace arch, through the nostrils of which they enter the combustion chamber. The gases of lower value formed at the less active slope of the fuel are indicated by blue (*B*). These rise vertically (there being little or no tendency to mix), pass through, and burn from the nostrils above, with the invariable result of a lower heating effect there as compared with the greater length of the combustion chamber. Precisely the same thing happens when nostrils are dispensed with, and the producer is an open

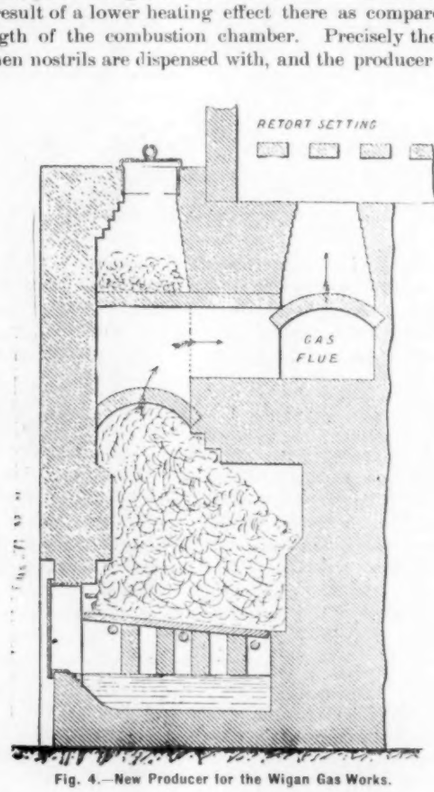

Fig. 4.—New Producer for the Wigan Gas Works.

one throughout to the setting placed above, supported by sectional arches springing from its walls. The author's experience of various forms of this arrangement of furnace has always borne out this difficulty and its nature, which is the difference in the composition and temperature of the furnace products. The effect of the latter is easily apparent, since, the lower the temperature of the gases, the less intense will be their combustion. With regard to the former, the author has analyzed several samples of gas taken simultaneously from the space above the fuel slope and the exit gas flue of a producer working under the conditions described, and with the invariable result of obtaining, in the latter case, an increased amount of combustible gases, averaging between 5 and 6 per cent. This last analysis represents, of course, the mixture; the actual difference would clearly be greater, and proportional to the quantity produced at either point. Nothing is of more importance in a retort setting than the maintenance of uniform and regular heat from mouthpiece to mouthpiece; and this can only be obtained (though there are other factors concerned) by directing into and distributing within the setting, previous to combustion taking place, gases of uniform quality and temperature.

Fig. 4 is a section of the producer designed by the author for the new gas works of the Wigan Corporation, the circumstances of which were peculiarly favorable to its adoption. Fig. 5 shows one of the last patterns erected at Vauxhall, where the head-room is much more limited. It will be observed in both of these that the conditions necessary for uniform gas production are complied with. The limits of a paper of this kind forbid any further enlargement under its first head, though the

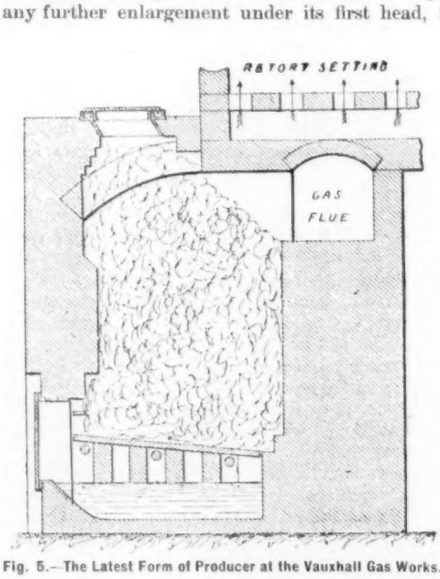

Fig. 5.—The Latest Form of Producer at the Vauxhall Gas Works.

subject is one which tempts fuller treatment in a communication devoted entirely to it.

Leaving, then, the producer, the author proposes to devote a few words to the consideration of its important adjunct—the secondary air supply. Since engineers first directed their thoughts toward the application of gaseous firing to retorts, probably no point of carbonizing plant has been so prolific in schemes as this one, that multiplicity of notions and variations thereon embraced under the euphonistic, if inapplicable, title of "regenerators." The old adage, that "what is meat to one may be poison to another," is indeed a fitting simile to the part they have played in the nineteenth century industries; since to nothing probably do iron, steel, or glass manufacturers owe more, and to nothing, perhaps, are gas makers indebted for less, if, indeed, we exclude that priceless boon of a dearly-bought experience. The reason for this is the more manifest when we consider that no two classes of heating operations are more distinct in character than those just mentioned. In the one, the whole energy of the burning gas is concentrated upon a single spot—the bath of molten metal; and even considerable variations in temperature simply mean greater or less speed in the conduct of the process. In the other case, the heat energy is required to be diffused equally and regularly and continuously over the whole length and breadth of the retort setting and its contents; while fluctuations in its intensity affect the economics of a retort house to a degree the importance of which cannot be overrated.

Low makes per ton, through too high and unequal heats; charge after charge burning to waste at the mouthpiece; relays of men continuously employed at that most abominal of jobs expressed by the too well-known title of "pipe-jumping;" retorts burned to a shapeless mass in 500 or 600 days, which should have lasted double the time—these are some of the evils which tempt one to believe that Pandora's box must have had its "regenerator." The author's views upon this last matter are too well known to require here a much fuller exposition than is contained in his

paper of 1886—views which are only confirmed by continued and wider experience. The craze for patenting cunningly devised tiles, pipes, and blocks of ingenious complexity and inherent instability, has gone by; probably not one of them is now worth more than the paper it is printed upon. Those who still advocate their use ask, Why, since it is necessary to heat the secondary air supply, must it not be better to use for the purpose a regenerator? quite overlooking the two vital points affecting the question—viz., that only a small proportion of the waste heat can be absorbed in heating up the secondary air; and, further, that so quickly is heat absorbed by air that it is impossible to introduce it into a gas-fired retort setting (properly distributing it for combustion) without its becoming heated to the necessary temperature. The air-heating arrangement used by the writer, and which answers its purpose perfectly, is simply a shallow flue, standing, with its covering, 7 inches above the floor line of the setting (the superstructure of which is independent of it), and it is absolutely too simple to go wrong; for, even if one of the cover tiles were to crack, it would be none the worse. It is impossible to say as much of *any* regenerator. A Continental engineer not long ago told the author that he always reckoned upon burning out his first setting in 360 days, as a result of the generator *settling down to its work;* and only the other day he had an opportunity of inspecting some settings in longitudinal elevation, which were a splendid illustration of the wave-line used by scientists to explain the undulatory theory of the transmission of light.

The last division of this paper merges into and is really an extension of the second—viz., the proper combustion of gas and air within the setting. The author has already laid down as an indispensable basis for perfect working that this must be equally and uniformly heated throughout, a result which he conceives can only be satisfactorily attained by those methods which distribute the heating points equally throughout the whole length of retort required to be heated. At Vauxhall, the producer being distinct from the setting, this is done by means of a gas tunnel formed upon the floor, and supplied by the main gas flue leading from the producer. The tunnel contains nostrils at close intervals from end to end, opposite to which the secondary air is admitted. Surely it must be self-evident that any plan of this kind is preferable to concentrating the meeting of gas and air at one point, and afterward attempting to minimize the intensity of their combustion by diverting them with baffles through the setting? Many failures have arisen from this latter mode of gas burning, another disadvantage of which frequently makes itself apparent in the irregular temperature of the retorts, especially when applied to that most unscientific of settings, the double-chambered one. To maintain a regular degree of heat through 20 feet of retort heated in this way is impossible, though the effect is not so noticeable in single as in through settings.

The foregoing paper is a brief epitome; and the statements laid down therein are the result of many experiments, trials, and experiences antecedent to, or consequent upon, the initiation of what may be called the Vauxhall system of retort firing. Brought under the notice of the gas profession about 18 months ago, by the end of the present year upward of 1,600 through retorts will have been set upon this principle. Its first cost exceeds but slightly that of the ordinary settings; greater uniformity and regularity of heats and working would not be possible; and its value in minimizing that most trying and enervating branch of retort house labor—viz., retort house firing—will be realized when the author states that he is making 3,450,000 cubic feet of gas with only four firemen in 24 hours. As to wear and tear, none of the retorts require or have any shielding, but are quite bare to the combustion chamber; yet, after between 600 and 700 days' working, are to all intents and purposes as good as ever.

To conclude, the author has endeavored in this paper to clear away some of the mystery and misapprehension which enshrouds to many this subject of regenerator furnaces and gaseous firing; and to show that in it, as in much else, the simplest is the best. In writing it he has been actuated by but one desire, to place clearly before his professional brethren his experiences in what must be always an important point of gas manufacture. If they prove of any value to them, he will have been more than repaid for what pains he may have taken.

Discussion.

The President said they would all agree in thanking Mr. Carpenter for his interesting paper on a subject which had been frequently discussed, but was capable of being discussed over and over again without being exhausted. He believed that if Mr. Carpenter had been successful in his adaptation of generator firing, it was chiefly due to the simplicity of his arrangement; and he quite agreed with him that elaborate arrangements were not the best way to success. He seemed to be of the same opinion as Mr. Foulis with regard to not establishing a very high rate of combustion in one particular part, but endeavoring to spread the combustion, as far as possible, throughout the whole chamber. This appeared to be the cardinal point in generator furnaces with secondary air supplies. He should be glad if Mr. Carpenter could add some information as to the consumption of fuel in these furnaces as compared with ordinary firing. It was a difficult matter to approach, because there were so many different ways of expressing such consumption, either as a percentage of the coke produced or weight of coke sold, or sometimes with reference to the weight of coal carbonized; and it was a pity they could not arrive at some more uniform way of stating these results by which they would be much more useful for purposes of comparison.

Mr. H. Hack (Birmingham) agreed that their thanks were due to Mr. Carpenter for bringing forward this interesting subject of gaseous firing, and he admired the simplicity of the furnace the author had shown; but, as the President had said, it was of the utmost importance, if they were to compare its utility and value with the other furnaces he had described, that they should be furnished with accurate data as to the fuel account. This was especially desirable at the present time when coke was very scarce and economy in fuel had again become such a matter of great importance. He should also like to have the figures of the analyses of the furnace gases and of the waste gases—important features in ascertaining the value of different kinds of furnaces. Only by analyses of the gases could it be accurately ascertained whether there was waste of fuel going on, and whether further adjustments of the primary or secondary air were required. Mr. Carpenter seemed to attach importance to his plan of distributing the gases equally over the setting.

Mr. Carpenter remarked that it was not his plan.

Mr. Hack said he understood Mr. Carpenter indicated that, by his arrangement, the gases were equally distributed; but this was not at all a novelty.

Mr. Carpenter observed that that was exactly what he stated. It was the best plan; but it was not his plan.

Mr. Hack (continuing) said that in the furnaces which emanated principally from their brethren on the Continent—the Germans—this arrangement was strictly adhered to. The gases did not impinge at one point, but came through a series of openings, as shown in the diagram. If there were any tendency to local heating, it was easily overcome by adjustment—by either partially or wholly closing up one or more of the apertures in the carbonic oxide chamber. He had had some considerable experience himself with this kind of furnace, and found that there was a little difficulty at first in getting the retorts to heat quite up to the mouthpieces; but in his case the difficulty was not so great as had been stated, and was not insurmountable, for they had had settings of this kind in operation at the Saltley works where the temperature of the retorts was fairly equal throughout. During the last four or five years he had had, as stated, considerable experience with gaseous firing and recuperation, and had met with some difficulties. He had, however, now arrived as near perfection as could be expected from furnaces of the type he had in use, and had derived considerable benefit from them, although not all the advantages—pecuniary and otherwise—he had anticipated when he decided to go largely into this kind of heating; the financial estimates having been seriously upset in consequence of the subsequent flooding of the market with coke, and the low prices obtainable for it. Things, however, had now turned round, and the value of the coke saved would assert itself. He might mention that, before they introduced furnaces of the regenerative type, they were consuming from 20 to 22 lbs of coke to every 100 lbs. of coal carbonized; whilst at the present time, with no other furnaces at work except those on the recuperative principle, the fuel account for the last two months had not exceeded 12 per cent.—averaging between 11 and 12 per cent. For some settings upon which he had specially had some tests made during the past week, it averaged but 10.19 per cent. But, however admirable and simple Mr. Carpenter's plan of heating the secondary air was, he maintained that the only proper and economical course was (if they were going to heat the air at all) to do it by the waste gases on their exit to the flue. Tests of temperatures taken of the waste gases showed that they were brought down in this way from about 1,200° F. to between 500° and 600° F.; and he attributed the saving in fuel he had shown to this reduction in temperature of the exit gases—the heat being carried back into the setting, and representing so much fuel. Still, it was right to say that if he had to begin *de novo*, he should not, he thought, use quite such extensive recuperators as they had adopted, but he should still go in for recuperation. When they obtained Mr. Carpenter's figures, he believed they would prove that heating the secondary air by the waste gases was the proper way, and that his percentage of fuel used was more than where recuperation was adopted. In conclusion, he would say it was of

vital importance, in comparing the fuel account for various methods of heating, to have one uniform system. Nothing was more simple than to say by actual weighing how many pounds of coke were used per 100 pounds of coal carbonized. It was no use to say, "You sold so many chaldrons of coke, when you only sold so many before," and to claim the difference as the economy effected. There should be careful tests of the fuel used, weighed into the furnace; the coal put into the retorts being also weighed. In this way they could tell clearly and positively what the advantages were, in the matter of fuel, of one kind of furnace over another.

Mr. W. A. Valon (Ramsgate), on rising, remarked that he had so often spoken on this subject that anything he might say would only be a repetition of what he had said before. He concurred with all that Mr. Carpenter had advanced; and he thought they had now reached the point at which they might say that the highly organized furnaces for bringing heat back again had been finally abandoned by English engineers. He agreed with Mr. Carpenter that the matter of heating air was a very simple one. He did not think that any means ought to be neglected by which waste heat could be brought back again into the setting, if there was any waste heat to bring back; but he put in the "if" specially, because he maintained that, in a properly constructed generator furnace, there ought to be practically no waste heat to bring back. If there was waste heat, they should take the simplest and best mode possible for the purpose of bringing it back. He should have liked to see a section of the retort heated by Mr. Carpenter. He knew something about it himself; and the greatest difficulty had already been stated, and that was, now the furnace was a very simple matter, to fairly distribute the heat over the setting, so as to get a uniform heat throughout. He congratulated Mr. Carpenter on having overcome this difficulty. He had seen the equal manner in which his retorts heated; and he, so far, had been as successful as himself in getting a really regular heat over the entire setting. During the last 12 or 18 months he had taken advantage of the information gained from the paper read by Mr. Carpenter at a meeting of the Southern District Association, and was perhaps getting to nearly the same state of perfection. He agreed that there should be a distribution of heat through the whole setting. They should not, however, attempt to spread the heat over the setting in equal proportions coming out of square holes; but there should be a central discharge, and this should be met and backed up by smaller discharges. This was the mode he had at present in operation; and it left very little to be desired. Mr. Carpenter had not given his make per mouthpiece; and he agreed that this point should not be pushed to great length, because they might find they sacrificed more than was gained by a very large make. He was glad to find Mr. Carpenter was going on successfully; and he felt sure that the matter was in able hands.

Mr. W. Foulis (Glasgow), as one of the English engineers who had not abandoned the attempt to bring back some of the waste heat, and who did not intend to abandon it, wished to say a few words on this paper, not by way of criticism, because he thought they were much indebted to Mr. Carpenter for introducing the subject. There was evidently a great deal of ancient history in the paper, which he did not object to; but it was scarcely fair to criticise in the way Mr. Carpenter had done those old forms of gas producers which were intended to deal with small coal and drosses, which necessitated having a much thinner layer of fuel than was the case when coke was used. With regard to the question of regeneration or recuperation, he would repeat what he had said before, that there was no necessity for any complication or any special arrangement of bricks. Air was not difficult to heat, but it required a certain amount of travel before it could be heated to a uniform temperature. He did not understand Mr. Valon's statement that there was no waste heat. With reference to the particular system that Mr. Carpenter had adopted for heating the air, it seemed to him to possess a very grave defect—viz., that they must necessarily have the air at different points of the flue at different temperatures. The air entering from the front of the setting, as he understood it, and passing up through the nostrils indicated in fig. 5, it was perfectly clear that the air from the first nostril could not be of the same temperature as that which had traveled some distance along the flue. Now the great benefit to be derived from this system of setting was the uniformity of the heat, not only throughout the retorts, but from one hour to another, and from one day to another; and this could only be insured by taking means to give the air a sufficient length to travel, so that all the air could be heated to exactly the same temperature. The method of bringing the air in through nostrils at different parts of the setting (and he presumed the gas also) was open, according to his experience, to this defect—that just at the point where the air and gas met, there was what may be termed an excess of heat, and a certain slagging action went on; and toward the back of the setting this was exceedingly difficult to clear away. He therefore preferred bringing in the air and gases as close to the furnace as possible in a large opening, and so arranging the gas and air ports that the air and gas should be diffused throughout the setting in such a manner that combustion would continue up to the exit into the waste flue. There was no difficulty in doing this, and no complication was needed. He did not require baffles or anything of the kind; and he was pretty sure that in his setting there were fewer baffles than in Mr. Carpenter's.

Mr. Carpenter observed that he had none at all.

Mr. Foulis said the results which it had been possible to obtain in the way he had indicated were clearly shown on looking into one of the settings at the Glasgow Gas Works with colored glass, when the combustion could be seen going on throughout the whole setting; and consequently there was a uniform heat from front to back, and from one day to another all the year through. Something had been said about the make of gas per mouthpiece being no test; but it seemed to him that, other things being equal, the real success depended on the make per mouthpiece. At one of their works, where, with the old system of firing, they were only making 6,500 cubic feet per mouthpiece, they were now producing 10,000 cubic feet without any more wear and tear of the retorts, and burning less fuel; and surely this was an advantage worth considering. He thought if Mr. Carpenter pursued the subject a little further, and tried the other system as he had this, he would find it was possible, without any complication, to heat the air much more uniformly, and to greater advantage, by waste heat than by the system he had adopted.

Mr. W. Carr (Halifax) said he had not heard the whole of the paper, but he gathered from it, and from what he had previously heard, that Mr. Carpenter had a very successful system at work. He did not, however, think the paper quite showed why it was so. The author had an arrangement which was successful in giving uniformly good results; but, if he understood the paper aright, he did not give any account of the reasons, but, with commendable modesty, said his opinions were too well known to require repetition. He (Mr. Carr) did not know what those opinions were, probably owing to his own want of reading; but he thought any paper brought before the Institute ought not to depend upon opinions being too well known to require repetition. His own opinion of the setting, as far as he could follow it, was that it was a very unscientific one altogether; and although it might have been successful, he thought, with Mr. Foulis, that, if the thing had been followed out more fully, it might be very much more successful than it was. It was quite evident to him that if a system based on this were successful, if it were carried further it would be a very much better system than it was. He understood Mr. Carpenter to say that only a small proportion of the waste heat of the departing gases could be absorbed; and further on that the secondary air took up heat so rapidly that any complicated flues were unnecessary to heat it. These two statements seemed to be more or less contradictory. They knew that the quantity of secondary air, although it might take up its heat very quickly, passing into a setting during 24 hours would be so enormous that, if it could only be heated to the required temperature, it would absorb from it a large amount of heat somewhere. Mr. Carpenter obtained his heat from the setting itself, and did not make the slightest attempt to utilize the heat of the gases which were leaving; and this was where the system appeared to be unscientific. But notwithstanding that, it might still be very successful. He thought the secondary air going into the setting was capable of taking up heat very rapidly; and with very simple means, as Mr. Foulis pointed out, this air might be sufficiently heated for the purposes required without going into the setting at all. If this were done, some portion of the heat would be certainly saved which was now lavishly used in heating the secondary air. One other point insisted upon was the question of equal diffusion of heat through the setting. This matter was very fully gone into at a meeting some few years ago at Manchester, and the necessity of equal distribution of heat was fully pointed out. He agreed with Mr. Carpenter in his mode of distributing the heat, rather than with Mr. Foulis, who thought that the two gases should be brought together near the front. Probably Mr. Carpenter owed much of the success of his system to this circumstance—the careful and equal distribution of the secondary air and gas along the line of the setting, so that combustion should be taking place in many places, instead of in only one. If he understood it rightly, Mr. Foulis's idea was to continue the supply of gas and air, so that combustion could not take place immediately they came together, but be continued in a somewhat elongated flame throughout the whole of the setting. He did not think that was the idea which was brought out by Mr. Carpenter; and, though no doubt it was a good one if it could be worked out, it was much more difficult to accomplish

it by any system of setting than the one Mr. Carpenter had introduced in what he termed the Vauxhall system. There was this advantage about the Vauxhall system—that it was simple and easily obtainable. By the arrangement of the air flues and nostrils, they could so divide the admission of the gas and air that they might cause a diffusion along a very large portion of the setting mechanically, and they might have quite as good a chance of continuing or elongating the flame as by Mr. Foulis's plan of introducing the gas in bulk at the front. This ground had been gone over a great many times; but notwithstanding Mr. Carpenter's experiments and his results, he thought they were a long way from arriving at a settlement of the question. They were still in the early days of heating by gaseous firing; and although they might get a very uniform heat along a certain line, the object to be aimed at, and which was most difficult to obtain, was to get the same heat at the point where the gases left the setting that they had where they entered. This was, on the face of it, almost an impossibility; but he believed, in the course of time, a much nearer approach would be obtained to it, and any experiments carried out on this system ought to aim at that result. Whether it should be by the admission of the secondary air at different stages of the setting, he was not prepared to say. He had succeeded fairly well in this system of firing in the diffusion of heat after the manner Mr. Carpenter pointed out, and had been pretty successful in getting, in a setting of nine retorts in one bench, a fairly uniform heat throughout. He put the same weight of charge into each retort; the duration of the charge was the same; and they got exactly the same work out of the whole nine mouthpieces. Still, the later retorts were hardly so hot as the early ones; there was a noticeable difference even in the best of them. Personally, he was much obliged to Mr. Carpenter, and to anyone else who made an honest effort to try and bring out something new; and he thought the discussions which had taken place there had done much to clear the ground with regard to this system of firing. They owed a great deal to Mr. Valon for the efforts he had made. He got on the wrong track once, but he was the direct means of bringing the truth to light, and of putting a great deal of valuable knowledge before the members which they had not previously possessed. He trusted they would not sit down with the idea that the Vauxhall system was the *ultima Thule* to which they ought to aim, but would go on inquiring and trying to get still more light on the system of gaseous firing as applied to gas retorts.

Mr. G. R. Hislop (Paisley) was able to agree generally with the views expressed by Mr. Carpenter, but wished to point out that there were certain conditions which, if carefully observed in the construction of producers, and the arrangement for the distribution of gases could scarcely fail to bring about success. First, he would urge the absolute necessity of having the depth of fuel quite regular. In the drawings there were some very bad examples, and some very good. No. 2 was a very bad example, because of the irregular depths of the fuel. At the thin part immediately above the bars anyone could see at a glance that the air would take the shortest passage to get into the open space above; and the result would to a large extent be perfect combustion in the producer, where it should not take place. But where the fuel was spread over the bars in a uniform depth they had the same gas—carbonic oxide—produced at the top. Therefore a most essential condition was uniformity of temperature in the producer, and uniformity of distribution of carbonic oxide over the whole length of the setting. Mr. Carpenter took the gases out at different ports along the setting, admitting the heated air at the side of each, and in this way he obtained uniform heating. Another important thing was absolute control over both the primary and secondary air. If they wanted to stop the firing and retort working for a short time—say, on a Sunday, and he was glad to find that the cessation of Sunday labor was being encouraged—with the control of the air they could shut it off; and the fuel would remain in a quiescent state for 12 or 18 hours, and started again without any loss of heat whatever. Another essential was the absence of great elaboration in the regenerative flues; it was a great mistake, and often led to failure. He could not see, however, that it was possible to maintain a uniformly high temperature throughout an oven of retorts, and have the gases issuing from it so low in temperature that there was nothing in them to take back to the producer and the setting. It was a very important feature to heat the air by these waste gases which otherwise must carry away a large amount of heat into the flues. As much of this as possible should be carried back by the secondary air; but great elaboration was certainly not necessary to effect this to an extent which would be economical and safe.

Mr. George Livesey (London) said he had not intended to speak on this paper, but it was necessary to say a word or two. Perhaps the best way of ascertaining the merits of the furnace was to see it; and at the Vauxhall works of the South Metropolitan Gas Company, where the furnace was in operation, any members were quite welcome to inspect it or anything else. He had some kind friends who were anxious, not only to disparage himself, but the South Metropolitan Company in any way they could. As a result, there was an impression abroad that there was a disinclination on the part of the Company for their works at East Greenwich to be seen. He could speak for the South Metropolitan Company for pretty nearly half a century; and never during the whole time that his father, his brother and himself had been connected with it had there been the slightest objection to anyone seeing what there was to be seen there. They had always been welcome, as a great many then present knew; and they were as welcome now as they had been any time during the past half century. If any gentlemen wished to visit the East Greenwich works they might do so, and everything would be fully explained by Mr. Tysoe, or whoever might be there. They were ashamed of nothing they had done there. They might have made some mistakes, as everyone did. They tried to do things in the best way possible; and in trying a new plan they did not always quite succeed. But they were fully prepared to take the responsibility of anything they tried, and to give the benefit of their experience to their brethren all over the country, or all over the world if they liked to come and see. As to the East Greenwich works, it was felt that they were not sufficient in themselves at present to warrant an invitation to the Institute to visit them. They were not finished—there was not enough to see, and there was not time to manage it. As there were friends from the Continent, of course, Beckton stood first; and it was thought must take precedence, and they must be invited to see these great works. If, however, they wished to visit the South Metropolitan works they were quite welcome—any manager might go and see whatever there was to be seen so long as he (Mr. Livesey) had anything to do with the Company.

Mr. Carpenter, in reply, said he feared the ground taken in the paper had been somewhat misunderstood. It had been objected that he had brought into it too much ancient history. He introduced that ancient history with the view of explaining a great many accidents, to use the mildest expression, which he knew had occurred through gas furnaces. That was why he brought in (in fig. 2) the sketch of the old type Siemens producer, and in fig. 3 illustrated how it was gradually pushed under the retort setting for the purpose of heating it; endeavoring to show that it was a very bad form, and that it would be better to go back to one designed some 50 years ago. The arrangement employed for admitting the secondary air was also misunderstood. The diagram did not show the air at all; it simply endeavored to indicate the gases rising through the nostrils into the setting. As a matter of fact the air did get uniformly heated throughout the whole setting, because it doubled back by means of a feather contained in the flue. It was a difficult matter to explain without a lot of drawings, and he was not anxious to describe his system so much as gaseous firing itself. If the members came to Vauxhall, they would be able to see the arrangement far better than he could explain it there. He had not the analyses of the gases with him; but they were working with about ½ per cent. of free oxygen in the waste gases; and as to the relative amount of combustible gases from the fuel slope of the producer, they had from 25 to 26 per cent. at one point, and about 33 per cent. at the outlet; showing a difference of 5 or 6 per cent. As to fuel, he had said all he wanted to say about it. The figures on which he based his experiments were in the paper he read some time ago. He had done nothing to disprove them, or found out anything which showed the fallacy of them. With respect to the make per mouthpiece, it was just whatever they chose to make it. They might get up what heats they liked with this arrangement as with any other. It was simply a question with him of having as few stopped pipes as possible; but his make was about 12,500 feet per retort, which were "throughs," 20½ by 15 in. Mr. Hack said something about the gas distributing arrangement not being new. He did not say for a moment that it was new; he only said that it was the best way of doing it. Only the other day he was shown some drawings of settings about to be put up which were going back to the old arrangement of a large gas port, and two large air ports opposite, as if the endeavor was to melt down the setting in that particular place as quickly as possible. He was only anxious to show that the arrangement indicated in the drawing for the distribution of the gases was, in his opinion, the best way of accomplishing it.

THE Davenport (Iowa) Gas Light Company has contracted with the National Gas Light and Fuel Company for the erection of a Springer plant, to have a daily capacity of 175,000 cubic feet. The work is to be completed in less than two months—the contract says, "On or before October 1st." General Manager Hauk evidently believes in doing things quickly; better still, he never does anything by halves.

The Relative Value of Coals to the Consumer.

Prof. H. M. Chance, who may be considered an authority in respect to this perplexing question, recently made the following argument thereon before the Institute of Mining Engineers. The Professor said:

Should inferior coals, in open market at competing points, command a price equal to that of the superior coals with which they come into competition?

This query seems absurd, and the answer seems obvious. It might readily be supposed that the better coals always command the higher price, but every dealer knows that such is not the case, and that even when current prices are shaded on second and third grade coals, the difference in price is rarely commensurate with the difference in quality.

To the consumer this must be a matter of real practical importance—of dollars and cents—and it seems somewhat strange that it has not received more attention from practical men of business. Ironmasters buy their ore by the unit of iron contained in the ore, and the value of copper, lead, tin, manganese, silver and lead ores is estimated in the same way; but it is evident that this method could not successfully be applied to coal except in a broad and general manner, for the value of a coal is not wholly dependent upon the percentage of combustible matter, but varies with the relative percentages of water, sulphur and ash. Thus two coals showing respectively—

Combustible matter.....	95.00	95.00
Water.....	0.50	2.50
Sulphur.....	0.50	0.50
Ash.....	4.00	2.00

will not have the same value as fuels, and as each of these impurities may vary between wide limits, the application of the analytical method is beset with many difficulties. However, if it is restricted to coals with small water percentages, and only used to determine the relative values of coals having approximately the same fuel ratio (ratio of fixed carbon to volatile hydrocarbons), the results should be as satisfactory and reliable as any known method. It is true that by this method the sulphur is treated simply as an impurity; but as we have no means of estimating the damage resulting from any specified sulphur percentage, it is not possible to express in figures what concession should be made in the price of any coal containing a certain sulphur percentage to cover the damage resulting from its use.

Again: the relative proportions of volatile matter and fixed carbon, the structure of the coal and its behavior in the fire are all variable factors of great importance to the consumer; for it does not follow that coals showing the same percentage of combustible matter are of equal calorific energy, or equally well adapted to meet some special trade requirement.

But, other things being equal, it is evident that coals containing large percentages of water, sulphur or ash, should not command a price equal to those low in impurities. However this may be, dealing with existing conditions at the principal coal markets, we find a remarkably different state of affairs.

The consumer often appears indifferent to the quality of the coal he is purchasing, regarding concessions as to time, or a slight shading of the price, of more importance than the quality of the coal. If desiring a coal for use under boilers he seems satisfied in obtaining a "strong steam coal," without stopping to inquire how much more steam might be made with the same or a less quantity of coal lower in water and ash, or how much less damage to grates and boilers would result from a coal lower in sulphur.

In reality I believe that this indifference is only apparent and not real, and that it arises from a conviction that there is no trustworthy means of estimating the relative values of the different coals offered for sale. Private analytical work being too costly, and steaming tests more so, there seems to be no available data to guide in determining what coal to purchase, and how much above or below current quotations should be paid for any particular coal.

It does not seem beyond the province of the United States Geological Survey and the various State surveys to enter upon investigations having as their object a careful differentiation of the relative values for different purposes of the various coals sold in the market. To accomplish this end it would seem that the samples analyzed and experimented with should be obtained at the point of delivery, just as the samples of phosphate fertilizers are now obtained by the State chemists for analysis.

In the absence of such comprehensive investigations it would still seem that the analyses made by the different State geological surveys would be of great assistance to the consumer in determining the relative value of different coals; but the specific facts needed for this purpose are commonly scattered through voluminous reports through which he has neither the time nor inclination to search; the analyses are often designated by the local name of the mine, the market name or the owners' or operators' name being omitted, or one substituted for the other; differences in the geological nomenclature of coals in adjoining districts constitute an almost insuperable obstacle in attempting to make any generalizations or comparisons, and the attempt (if made) to use the recorded facts is commonly abandoned in disgust, and the consumer falls back upon his own experience and that of others, and the market reputation of the coal as his only guides.

In the absence of governmental work of this class, and in the overstocked condition of nearly all the principal markets, it is somewhat surprising that the companies mining and shipping the superior coals have not taken systematic action to control these markets in their own interest, to the exclusion of their less fortunate competitors, by supplying the consumer with information that would enable him to discriminate among the various grades offered for sale. Manufacturers of many articles adopt similar methods with advantage, and there does not appear to be any reason why such a plan might not result in benefit to both the producer and consumer of coal.

It does not seem difficult to foretell the probable ultimate effect of the adoption of such a plan, for discrimination by the consumer would inevitably lead to sharp cuts in the quotations of the inferior coals. Concessions in price sufficient to warrant the purchase of the inferior coals would destroy all possible chance of profit to the producers (unless located nearer market, with lower railroad freight charges than their competitors), and it would seem probable that in the operation of the law of the "survival of the fittest," producers of second and third grade coals would be crushed out of existence. In some cases, however, closer proximity to market or advantages derived from competing transporting companies would enable the miners of inferior coals to make such concessions, control their own market, and reap handsome profits. Again, in these instances of coals inferior in composition but especially adapted to certain uses, or to meet peculiar trade requirements, the poorer coal could not be displaced; but under such conditions this poorer coal is in reality the better article (for these special uses) and should command the highest price; here analyses (as commonly made) are almost worthless, and the practical test of experience destroys in a moment any relative valuations deduced from chemical composition.

Basing the relative value of a coal upon its percentage of combustible matter ("fuel"), the value is not exactly proportionate to this percentage; for a certain deduction is to be made to cover the increased cost of stoking and removal of the ash, since, with every reduction in the percentage of combustible matter, a correspondingly increased amount of coal must be burnt to make the same quantity of steam. If the cost of stoking a ton of coal be taken at 6¾ per cent. of the cost of the coal (and this is about what it will average with coal at $3 per ton and labor at $1 per day), and the cost of handling one ton of ash at double the cost of stoking one ton of coal, the following figures are obtained:

Relative Value of Coals.

Fuel per Cent.	Increased cost of stoking and removal of ashes.	Value Ratio.	Fuel per Cent.	Increased cost of stoking and removal of ashes.	Value Ratio.
100*	— 0.00 =	100.00	87	— 2.98 =	84.02
99*	— 0.20 =	98.80	86	— 3.26 =	82.74
98*	— 0.41 =	97.59	85	— 3.52 =	81.48
97	— 0.62 =	96.38	84	— 3.80 =	80.20
96	— 0.83 =	95.17	83	— 4.10 =	78.90
95	— 1.05 =	93.95	82	— 4.38 =	77.62
94	— 1.28 =	92.72	81	— 4.68 =	76.32
93	— 1.51 =	91.49	80	— 5.00 =	75.00
92	— 1.74 =	90.26	79	— 5.32 =	73.68
91	— 1.98 =	89.02	78	— 5.64 =	72.36
90	— 2.22 =	87.78	77	— 5.98 =	71.02
89	— 2.46 =	86.54	76	— 6.32 =	69.68
88	— 2.72 =	85.28	75	— 6.66 =	68.34

*It will be understood that these high percentages are purely theoretical, and are here added only to complete the symmetry of the table.

Boiler Management.

A practical man, in considering the subject of boiler management, says there are engineers and steam users who pay no attention to holding steam over night. Perhaps in no other way will so small an amount of work repay one so abundantly and so quickly. Of course, the direct return is fuel saved, while the indirect (and not the least) is the increased life of the boiler by reducing very largely the expansions and contractions. One would suppose that this would be a stale truism, yet the fact

remains that a great many stationary boilers are sadly neglected in this respect.

I give an experience for the benefit of whom it may concern. I took charge of an old plant. No damper; furnace doors out of shape, and the walls leaking. I put in a good fitting damper, and refitted the doors so they shut tight. The result was it held steam until midnight. Then I took fireclay mortar and went over the walls inside and out, and then could hold steam easily. Have 20 pounds of steam at 6 A.M.; do not bank any fire; and lastly, save 200 pounds of coal daily over the other practice.

When it is impossible to put in a good damper, owing to the shape of breeching, take a piece of sheet iron and cut it out to fit the front head so as to cover all the tube ends. It should be stiff enough to stay flush up to each tube. A pair of side braces, swinging from a rivet, may be put in so as to hold the cover in place. By putting in this cover, after shutting down, one can easily hold steam.

I wonder how many boilers get the fire surface of the shell cleaned except when down for repairs. I saw one bright fellow—now retired—use the hose, but I don't think it did the wall any good. To clean properly nothing is better than a wire brush. There is nothing pretty about the job, nothing that makes your helper desire to wade in and earn glory, and generally he has business somewhere else at that time. Using soft coal and shavings I find it pays to clean the shell every two weeks. It is also an excellent time to observe this or that seam, rivet or tube, and thus be able to detect any new defect, and one will sleep better, having done his whole duty.

Cement Floors.

Prof. R. C. Carpenter, of the Michigan Agricultural College, gives it as his opinion that cement floors, particularly for barns and outbuildings, are very valuable. In the first place, they are impervious to liquids, and will retain all the manurial matter that is placed on them. In the second place, rats and other vermin cannot burrow through them, and, so far as experience goes, will not burrow under them to any great extent. Floors made with American cement will not generally be tough enough to withstand the treading of animals, and should be protected by a covering of boards. A covering of English Portland cement, about 2 inches in thickness, made by mixing three parts of sharp sand to one part of cement, with water just sufficient to damp it, and thoroughly rammed in place, will stand treading of animals, but will, I think, in most places be more expensive than a board covering.

Method of Construction.—A foundation for such floor should first be made. This is done by laying a course of small stones from 2 to 4 inches in diameter. Ram these in place with a ram made of a block of wood about 10 inches in diameter at the lower end, and 2 or 3 feet long. After this course of stones is in place, make a mortar by using one part, by measure, of quicklime, one part of American cement, ten parts of sand and sufficient water to make it very thin. Pour this water as soon as mixed on the course of stones, and with a common hoe work the mortar into all the cracks. Sufficient mortar will be used when the cracks are full. After the first course is completed a second one should be put on. This will make a total thickness of about 6 or 8 inches. If a floor is to be laid for a stable, joists of 2 by 4 scantling should be bedded in the upper course and allowed to project about ½ inch above the course. Before the floor is laid a mortar made of one part quicklime, one part American cement and six parts sharp sand is spread over the surface and leveled off from joist to joist. The boards or planks for the floor should be laid at once while the mortar is soft. This last course of mortar may with advantage be replaced by a mortar made of hot coal tar and sand, mixed and applied while hot.

If the floor is not to be trodden on by animals it will do to finish it with a coat of cement mortar, about 1 inch thick. The mortar for this finishing coat should be one part sand to one part cement and no lime. If a cement floor is needed for a stable a covering of Portland cement mortar as described should be placed upon the stones.

I have seen very good floors made by mixing hot coal tar with sand and stones, instead of lime or cement as described. This floor will give off its characteristic odor for a long time, however, and cannot be recommended when such odor is objectionable. The floors under the cattle stable, and also the piggery at the Michigan Agricultural College were constructed substantially as described. All the surfaces of woodwork in contact with the mortar were first coated with hot coal tar. This work was done in 1871. In 1886 it became necessary to remove the piggery to a new site. The floor was well preserved, but the joists bedded in the mortar were badly rotted. The cattle stable floor is apparently in as good condition as when first put down.

I wish to say just a word regarding the use of cement and lime. Cement should be used as soon as mixed with water, as it very soon hardens or sets. This operation should not be disturbed, and if it takes place even in a small degree before the mortar is deposited in its permanent place it will never become as hard as though it had not been disturbed. Lime mortar is rather improved than injured by allowing it to remain a long time after being mixed In this article I recommend the use of equal quantities of lime and cement, solely on the ground of economy. If the foundation is, however, in the water, the lime should be replaced by cement, but for all ordinary circumstances a mixture of half lime and cement gives better satisfaction than pure cement—such a compound forms a water lime that, although it will not set under water, still, when once it is set, will not be affected by water. For ordinary floors I think it becomes in time harder than pure cement.

A Problem for ngland's Sanitary Engineers.

At the annual meeting of the English Association of Municipal and Sanitary Engineers (held in London, last July) the President (Mr. E. B. Ellice-Clark) delivered a very interesting address, in the course of which, after referring to other important problems now receiving the attention of those who strive to ameliorate the danger to health and morals arising from neglect (or worse) of sanitary conditions, the speaker thus referred to a phase of the subject over which American minds are deeply pondering—although incited thereto from a cause widely differing from that which gave rise to Mr. Ellice-Clark's remarks. Our authority says:

There is much to be done in the arterial drainage of towns, and also in the prevention of floods in the great river valleys of this country, and in discovering, inventing, or designing an economical pavement, which must be impervious, insonorous, durable and non slippery. The municipal engineer has given to the larger populations during the past forty years good water supplies, better drainage, and better paved streets, and has also instituted some systems for the removal of decaying matters accumulating around dwellings more or less successful, but there still remains other work for him to execute. Before the sanitary condition of our towns is anything like perfect, we must do something more than prevent air pollution from decaying matters. The salubrity of a town, though depending very much on the foregoing, is still incomplete while air pollution by smoke takes place as it does at present. You have lately been discussing the question of the merits of the so-called "Destructors." No doubt the economical and speedy removal of house refuse requires a practical solution, and it may be that the so-called "Destructor" is, for the moment, the most ready and practical means available for accomplishing this object; but it certainly is, as its name indicates, a barbarous and unscientific system.

Owing to the cheapness and availability of fuel in this country, we pursue a method of obtaining heat in dwelling houses which is only one step removed from the consumption of fuel on an open hearth in the tent of the savage, and the same unscientific method of obtaining heat prevails (only in a lesser degree) in nearly all the factories of this country. By the imperfect and partial combustion of fuel in an open fireplace, we not only do not obtain one-half of the effective value of the fuel, but we pollute the atmosphere to such a degree as to make the air of most of our cities, through a considerable portion of the year, almost insupportable. Let us conceive for one moment what a beautiful city London would be, even in winter, without the well-known London fogs, which are largely due to the presence of unconsumed carbon caused by smoke from domestic fireplaces. Take, again, the Lancashire towns, from Manchester to Preston, through Darwen and Blackburn. These towns are physically situated in a series of the most beautiful valleys in England, and if they were freed from smoke their natural position would certainly render them desirable places of residence, which cannot be said under their present condition.

The future municipal engineer must, therefore, among other things, pay attention to the prevention of air pollution by smoke. Many attempts, as you well know, have been made during the last half century to accomplish this object, and a few years ago an exhibition was held in London for the purpose of demonstrating that such pollution can be prevented. No doubt considerable advances have been made in this direction; but in my judgment any attempt to overcome the difficulty by burning fuel in an open stove will end in failure. We are nearer a solution of this subject than is generally supposed. The manufacture and distribution of non-luminous gaseous fuel for heating purposes from a central station is not very far distant; by this means you will not only prevent air pollution by smoke, but you will be able in a very large degree to overcome the difficulty of removing decaying matter not passed into the sewers. If such a system were at work in town there would, of

course, be few or no cinders or ashes to be removed from houses, and there should be no difficulty in designing such a stove, fed by gaseous fuel, as would, in every house, consume the decaying matters which now form so large a bulk of "house refuse."

Coal Tar as Fuel for Steam Boilers.

Mr. John McCrae, of Dundee, Scotland, read the following paper on the above subject at the recent meeting of the North British Association of Gas Managers:

About three years ago, when the sudden and serious fall took place in the value of the secondary products produced in the gas works, many gas managers, ever desirous of doing their very best for their employers, were forced to look around for some better market in which to dispose of the products which had so seriously fallen in value. This was no easy task, and even now it forms a very uphill work indeed. A comparatively new market has been created for the disposal of boiled tar at several of the German ports, but the expense and difficulty of loading ships with tar in casks take very much from the saving derived from the new manner of disposal. It occurred to me, therefore, that we must look nearer home for a remedy. In all gas works of any magnitude a considerable quantity of fuel must be employed for the purpose of supplying the works with steam for the exhauster engines, chemical apparatus, thawing purposes, etc. Whether this fuel consists of coke or of coal will not in the least affect or alter my figures. I have no doubt that if any manager discovers he is working more economically by selling the coke and using a cheap small or other coal, he will adopt the cheapest process. In Dundee, where we get a good price for coke, I found, for the purpose of steam fuel, it were far cheaper to buy a small coal costing from 5s. to 5s. 6d. per ton delivered in the works, and dispose of the coke. The question of fuel then lay between coal and tar. And I have experimented somewhat extensively to ascertain the true relative value of the two classes of fuel. For the purpose of this paper, and within the last few days, I made a further examination into the question, and the results arrived at will be those here quoted. The coal we employed was what is known as Stravenhouse small coal, and which costs 5s. per ton delivered. The experiment in each case lasted 48 hours. The tar employed was what is known as boiled tar, the naphtha having previously been removed, but the pitch oil was left in the tar. The value of this tar in Dundee is about 4s. per ton. The following are the figures:

Coal, 10 tons 16 cwt., at 5s.	£2	14	0
Tar, 1,460 gallons or 9 tons 3 cwt. (160 gallons = 1 ton), at 4s.	1	16	7
Saving per day by using tar	£0	17	5

And this at the longest day, when we are using a mere fraction of steam, as compared with our winter requirements, and consequently the profit is proportionately less than it will be when we are in full work.

[At this point the speaker called the attention of his audience to a diagram giving in detail the features of the Messrs. C. & W. Walker's tar-sprayer burner, which he explained was the appliance made use of by him in accomplishing the method of tar burning followed in the Dundee works. He then continued:]

The tar, which has been brought forward to the boilers in a thoroughly liquid state, is discharged from the center of the injector into the furnace of the boiler. Surrounding the center nozzle of the injector is an annular space through which high pressure steam passes, also into the furnace. The meaning of this steam moving along with the tar is to force a draught, as well as to raise the temperature of the tar, and so partially converting the tar into a vapor, thereby making the combustion more complete. The flow of the tar is regulated by the very delicate sluices attached to the injectors. The valves consist of elongated cones and plugs, and are constructed not only for the purpose of regulating the flow of tar, but also for removing any obstruction or incrustation which may accumulate in the nozzle. In order to keep the tar in a liquid state, and which in the winter time is not an easy matter, a small steam pipe is passed through the center of the tar pipe, but of course no steam is discharged amongst the tar, as the presence of water in the injector prevents its correct working. The steam pipe is simply passed through the tar pipe, and a steam trap attached to its end.

In changing from the coal or coke fuel to the tar, little or no difficulty is experienced, and very rarely is a shovelful of any kind of solid material required. The furnace bars have only to be kept covered to prevent the waste of tar and the too rapid ingress of air; and when the furnaces are in full work, and being well and carefully attended to, the tar will be found to have been nearly all consumed before reaching the solid material covering the bars.

The action is very much the same as in the paraffine oil lamp. The wick is the medium by which the oil is brought to the point of combustion where it is developed into light, and the wick remains little injured although in close proximity to such intense heat. The oil burns, not the wick. In the tar furnace the tar burns, and the tar only. It will be easily understood that a little experience is necessary to enable the attendant to fully understand the quantity of tar by which complete combustion is to be obtained, and which in no case must be exceeded. The moment one atom of tar is sent into the furnace beyond that which can be thoroughly consumed, you have then the most hideous discharge of black smoke (carbon) which it is difficult to describe, but which can be easily understood, and, I believe, can be seen within a few miles of where we now sit. I should mention that the injectors are fitted on the furnace doors, but the connections are of such a nature that the doors can be opened without disturbing any of the permanent fittings. And now I have told you that the results detailed in this short paper were those obtained in the Dundee gas works. This is so; but were I to leave the matter here it might be inferred that I considered similar results might be obtained in any or every gas works. I would not mislead you, and therefore must detain you a few moments longer to show you how my town is different from many others. Dundee is very peculiarly situated in this respect. It is a long distance from any tar distiller's works capable of dealing with the large quantity of tar we have for sale during the winter. A large portion of the value of our tar must, therefore, go to the Railway Company to cover the cost of transit between the two points, and so the tar distiller can allow us but a small figure for it at the starting point. Then, again, Dundee being far distant from the coal fields, the coal is exceptionally high in price. I quite believe that in many of the West country towns the coal for which we are paying 5s. per ton could be had for 3s. per ton, and the tar for which we are receiving 4s. per ton they would receive not much under the double of this; therefore you see, in a place so circumstanced, the figures I have given would be most misleading. Still, I doubt not there are places as badly situated as Dundee, and it is to such places that my remarks are directed. I believe, also, that in many towns distant from collieries the tar might be sold to manufacturers for use in their steam boilers, and such an arrangement would, I think, prove advantageous both to the seller and the user of this liquid fuel. I think as much has been said in regard to our subject as is necessay, but permit me to add that I believe there is a future for liquid fuels. I do not say tar, but more concentrated fuels, such as crude naphthas, paraffines and pitch oil. When you see one of our large steamers taking in her bunker coal, it must have appeared to you that there was a great waste of power here. Every ton of coal laid in must take a certain amount of power to carry it, and every ton of coal so laid in reduces the cargo carrying power to that extent. A few gallons of oil will give you the steam-producing power of a ton of coal, and this is a fact which the owners of non-paying steamships should note. Take our locomotives, also. Everything I have said in regard to steamships applies to them, and the comfort to the stokers, and the general reduction in labor, would be very marked indeed. Of course, it may be argued that were such a large demand created for oils for furnaces the old-fashioned law of supply and demand might come into play, and so force up the price of the article for which the increased demand had taken place; but I think this state of matters is rather remote, when we bear in mind the great oil wells only now becoming developed, and the oils from which can be run in bulk direct from the wells into ships and brought to this country at very low rates.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Secretary Bogart, of the American Society of Civil Engineers, announces, by means of a circular letter, that the Board of Directors have decided upon a new move in connection with the compilation of the Society's *Transactions;* and we are of the opinion that the idea will receive general commendation. In future the Directors will receive—in fact, they invite professional papers and communications, on subjects of engineering interest, from all persons, whether members of the Society or not. The papers and communications so offered will be accepted for publication in the *Transactions* of the Society, subject to the rules laid down by the Society in respect to its publications. The rules provide, of course, for a proper editorial supervision, for the exclusion of old matter that is readily found elsewhere, of matter open to the suspicion of being put forward on the score of personal interests, of matter either carelessly prepared or controverting established facts (we presume this

clause will be liberally construed), and of matter purely speculative or foreign to the purposes of the Society. Discussion is also invited from all persons interested professionally in the papers presented to the Society, the discussions to be governed by the editorial rules that apply to the manuscript contributions.

THE authorities of Dover, N. J., have arranged for the maintenance of 86 incandescent (16-candle power) lamps, to burn all night and every night of the year. The agreed upon price for the service is $21 per lamp per annum.

WRITING about Dover's public lighting brings to mind a similar plan in vogue in a few of the hamlets on the north-northeast shore of Staten Island in this State. We think that the Dover authorities would have thought twice before signing their contract had they taken the precaution to visit Tompkinsville, New Brighton, Rosebank, or any other of the Staten Island hamlets which nestle along the line of shore noted. All of these places are lighted by 16-candle power incandescent lamps, and a greater farce in the shape of artificial illumination it would be hard to conceive. The red-hot poker comparison even fails to do justice to the Staten Island exhibit of the light of the future. On the other hand, the splendors of the arc illumination nightly witnessed on Staten Island at the various spectacular shows—the Fall of Rome, the Wild West, etc.—is simply beyond description. Its grandeur is evident, and its effectiveness unquestionable.

THE Welsbach Incandescent Gas Light Company, of the Pacific coast, has been incorporated at San Francisco. The Directors in the enterprise are Messrs. Frank V. McDonald, Columbus Waterhouse, Sampson Tams, H. L. Coye and J. L. Stevens.

MR. WM. STRAY, who had been in the employ of the Chicago Gas Light and Coke Company since 1858, having latterly acted as general foreman, was fatally crushed on the morning of the 1st inst. Deceased was engaged at the time in overlooking the hoisting of some heavy iron beams in the Company's works at Crosby and Hobby streets, when the hoisting tackle gave way, and a falling beam felled the Superintendent, crushing him so badly as to cause his almost immediate death. Mr. Stray, who was in his 60th year, was very generally esteemed.

MR. HEQUEMBOURG, who for years has controlled the management of the Bradford (Pa.) Gas Light and Heating Company, has sold a controlling interest in the Company to the Citizens Gas (natural) Company, of the same city. The sale, however, is in effect nothing more than a consolidation of both Companies, for Mr. H. is the largest individual holder of the Citizens Company's shares.

ABOUT a fortnight ago the Brooklyn (N. Y.) evening (in fact, Brooklyn, with its three-quarters million of inhabitants, does not possess a single morning daily) newspapers came out in paragon headlines with a thrilling account of how five workmen had been killed in an explosion of gas at the works of the Fulton Municipal Gas Company. The chroniclers also had it that Supt. Jourdan was more *or less* "mangled." The reporters who wrote this affair up must have been looking through powerful glasses (probably in the neighborhood of some of the noted resorts in the vicinity of the City Hall), and with decidedly imaginative minds, for an explosion did not take place. The grain of fact in the story was this, as explained afterwards by Supt. Jourdan: "The story originated in an accident that often occurs in a gas works. A connection between a main and holder was being made, and the bladder valve which we were inflating burst, presumably because of some defect in it. The gas thus suddenly released overpowered those in the immediate vicinity of the escape, and I suffered with the rest. You can see how badly I was injured. The others of the 'mangled' are all at work."

THE streets of ancient Mexico are to be illuminated by electricity before the first of October.

IN connection with the consolidation of the Bradford (Pa.) Gas Companies it is understood that a uniform rate of $2 per month for each stove fired by gas will at once be established. Also that the charge per month per burner tip will be fixed at 15 cents. Cheap enough at that.

ANGUS SKY, a Caughnawaga Indian (if such tribe there be) who was injured in the explosion that, last May, wrecked a holder owned by the Montreal Gas Company, has brought a damage suit against the Company in the sum of $1,200. He refused to settle for $150. Sky's own figure is a pretty steep estimate of the value of a live Indian.

DIRECTOR WAGNER, on the first instant, opened bids for the construction of a new station meter at the Twenty-fifth Ward station of the Philadelphia gas works. The following bids were made: Harris, Griffin & Company, $4,550; American Meter Company, $4,525; Goodwin Gas Stove and Meter Company, $4,500. The latter firm received the award. On the same day the Wilbraham Brothers received the contract for an exhauster to be put up in the Twenty-Sixth Ward works. Price, $3,653.

MR. EDWARD F. SHERMAN, son of Mr. F. C. Sherman, of the New Haven (Conn.) Gas Company, has returned from an extended tour through the West. His journeying was punctuated by stops at the Montreal, Chicago, St. Louis and Kansas City gas plants. He reports great activity in the gas business all along the line of his trip.

THE American Gas Improvement Company has been incorporated in Jersey City (N. J.) by Messrs. Chas. H. Moss and J. P. Swan, Jr. Capital stock, $1,000,000. There would seem to be more in this venture than that indicated by its articles of incorporation, which mildly intimate that it is formed with the "intention of owning and manufacturing machinery for the generation of gas for heating or illuminating." Can it be that Jersey City is again threatened by those who act solely from philanthropical motives?

THE Committee on Fire and Water of the Anniston (Ala.) City Council have reported that the local gas works were constructed in accordance with the provisions inserted in the franchise originally granted the Company.

IN the death of William B. McDonough a prominent figure in the ranks of gas works constructors has been blotted out. Possibly deceased gained his greatest fame among the Western division of the fraternity, because (although born in Boston, Mass., on January 29, 1844) when he was only 8 years of age his parents emigrated to the West, having chosen Cincinnati as a location for their home. Having received a rudimentary education, which training was brought to an abrupt ending on account of stern necessity, young McDonough (in his 15th year) was indentured to the local plumbing firm of McHenry & Co., with whom he remained for four years, or until he had mastered the trade of gas fitting. Wishing to strive for himself instead of serving others, he established himself in the plumbing business in Memphis, Tenn. Here he remained and prospered for a time, or until an available opportunity (1869) for engaging in gas works construction presented itself. His first venture in this line was made at Holly Springs, Miss., and his success at that point confirmed his business career. In 1871 he erected the works at Chattanooga, Tenn., which enterprise was followed up by similar ones at Murfreesboro, Tenn., and Huntsville, Ala. Thence came in rapid succession (we are not sure that we name them in exact chronological order) the plants at Logan, Ohio, and at the Soldier's Home and the Insane Asylum, Dayton, Ohio; Paris, Ills.; Ionia and Manistee, Mich.; Danville, Va.; Citizens Gas Company of Maysville, Ky.; Wassau, Wis.; Helena and Butte City, Montana; Meridian, Miss.; Fargo, Dak. Ter.; and Spokane Falls, Wash. Ter. At the time of his death he was engaged on the Ogden (Utah Ter.) plant. From the foregoing it will be seen that deceased was a man of enterprise and resources, and possessed of boundless faith in the stability of the gas industry. Reserved in demeanor and brusque in action, these seemingly uneven qualities nevertheless shaded, while they did not conceal, a nature at once mild and genial. Impulsive but just, the late W. B. McDonough was a good type of the sturdy manhood that cares naught for the finesse by which the hypocrite seeks to gain favor—and which eventually deludes none save himself.

ON two or three occasions we have called attention to the munificence of the stipend meted out by the City of Detroit to the local official known and designated as the Gas Inspector. In short, the emolument awarded by the Straits City to its gas inspector was $5 per annum—only that and nothing more; hence the farcical nature of the berth. We understand that, attracted no doubt by the "honor" attaching to the position, it has at divers times been filled by a barber, a baker and a musician; and there is little reason to doubt that, if the "pay" had been kept at the original limit, in time Detroit might have had inspectors whose regular avocation would come under the respective designations of waiter, hostler or shoeblack. Whether or not the latter might have occurred under the old dispensation, happily the reason therefor is now averted, as a reasonable salary has been decreed to the person holding the office. At a recent Aldermanic meeting Ald. Jacob moved that the gas inspector's salary be increased, from $5 per annum to $1,200, but this did not suit the views of Alderman Burt, who suggested that $6 per annum would be a proper figure. Ald. Hollihan thought that $20 per week came

nearer to the correct idea, and after some skirmishing the latter adjustment was agreed to. We congratulate Inspector Rogers on the increase—the salary still seems to be decidedly meager—and Ald. Jacob on his common sense.

MR. W. H. FROST, recently in the service of the Chesapeake Gas Light Company, Baltimore, Md., has been appointed Superintendent of the 44th street station (Municipal branch) of the New York Consolidated Gas Company. Mr. Frost deserves his promotion.

IN the franchise for a gas works to be operated in Bakersfield and Sumner (Kern county) Cal., by Mr. C. B. Barstow, the authorities stipulated that construction work must be commenced within 90 days from the issuance of the ordinance, and that the plant be completed within one year.

T. LESLIE CARPENTER, Secretary to the Street and Sewer Department of the Board of Directors of Wilmington, Del., advertises that sealed proposals will be received at the Department, until 8 P.M., 21st inst., for lighting the streets of Wilmington by gas, gasoline, and electricity, for the terms of one, three, and five years. The contract is to run from Jan. 1, 1889. Mr. Carpenter will furnish specifications on request.

THE Port Townsend Gas Company has been organized by Messrs. B. S. Miller and A. C. Phillips, of Port Townsend, and J. L. Stamford, of Victoria. This place is the capital of Jefferson county, Wash. Ter., and is on Puget Sound, near the Strait of San Juan de Fuca. It is 74 miles (direct) north of Olympia and 44 miles northwest of Seattle. It has a good harbor, and is likely to become quite an important place. The Company has the right to operate in any part of Jefferson county.

THE holders of the gas franchise for Dalton, Ga., assert that their Company will speedily pass beyond the paper stage of existence.

AT the annual meeting of the Greenfield (Mass.) Gas Light Company the following officers were elected: Directors, F. R. Allen, F. A. Pond, J. D. Safford. W. N. Washburn, and W. A. Forbes; President, F. R. Allen; Clerk and Treasurer, Dana Malone; Auditor, W. C. Simmons; Superintendent, Henry H. Kelly. The new Superintendent was formerly in charge of the Brockton works, and succeeds Mr. Jas. Porter, whose resignation was reported in the JOURNAL. The Greenfield Company enjoyed a fairly prosperous business during the year. A new coal shed (to store 600 tons) is now being erected—a simple though much needed bit of housing.

A VERY interesting point is now before the attention of the municipal authorities of Nashville, Tenn., in the shape of a petition from the Nashville Gas Light Company for a reduction of the sum at which its property is estimated on the assessment rolls of the city. The local revenue act of last year provides that corporations engaged in the manufacture of articles out of any raw product of the State shall be assessed as firms or individuals are assessed. Taking advantage of this, the Company asserts that, as it carbonizes only Tennessee coal, its capital stock ($500,000) is therefore exempted by the law of 1887. The City Attorney gives it as his opinion that this construction is an improper one, alleging in support of his view that, if the act in dispute is properly construed by the Gas Company the act is unconstitutional, since the State Constitution provides that *all* property shall be taxed; and the shares of stock being personal property, the Legislature is without power to exempt from taxation, being prohibited therefrom by the Constitution. The best lawyers in the State incline to the view that either the Company is right, or that the Act is unconstitutional—the latter, however, being not by any means conceded, in view of the fact that the Legislative power is given sole authority to say what steps may be taken to advance or strengthen the commercial growth and prosperity of the State.

ARTICLES incorporating the Loomis Gas Manufacturing Company, of Michigan, have been filed with the County Clerk, of Detroit. The Company's initial capitalization is $100,000, all of which is said to have been paid in. The stockholders are given as Gordon W. Lloyd, 667 shares; Lee Burt, 667; Jno. R. Markle, 666; Hamilton Disston, Philadelphia, 10; Jno. Roberts, Trustee, Philadelphia, 1,980; Burdette Loomis, Hartford, Conn., 10.

THE Equitable Gas Company, Memphis, Tenn., which resulted from the joint efforts of the Katzenberger trio (brothers) and the "parent" Equitable Company, are ready for business—that is, either to sell gas, to listen to an offer for purchase, or to entertain a proposition to sell. In the meantime the old Memphis Company is said to be ready and willing to carry on a stiff fight which will eventually land the Katzenbergers and their backers on the sort of shore reached by others of the backers in the neighborhood of Baltimore, Md. The officers of the Memphis-Equitable are: President, W. Katzenberger; Vice-President, L. N. Falk, of Decatur, Ala.; Directors, Jno. Fox and H. Keene, of New York, and Geo. Gantt and M. H. Katzenberger, of Memphis. The Superintendent is F. C. Kniese.

THE Newark (N. J.) Gas Company is now engaged on the work of extending a main across the Passaic River to the suburb known as Harrison or East Newark, which will do away with the necessity for keeping open the East Newark branch works. The contractor, Arthur Sandford, considers the job about one of the worst that he has ever undertaken, and a diver in his employ (a man named Tullick) perfectly agrees with him. By the aid of a dredging machine a trench 600 feet in length has been formed on the river bed (the bottom of the trench is 16 feet below the surface of the river at low water), and at the Newark end a crib (25 feet in depth) has been constructed. This crib will contain two upright mains (30 inches in diameter), to which will be joined two 12-inch bell and socket joint mains, these being carried over to the Company's Harrison property at a point between Third and Fourth streets. A connection is then to be made to a suitable main which is to run along Cape May street to Fourth street, and on to Harrison avenue.

IT is reported that the selectmen of Stoughton, Mass., have decided to grant the petition of the Standard Gas Company for the right to operate a gas works there. The maximum charge for gas must not exceed $1.50 per thousand cubic feet.

MR. JAS. A. FOSTER, has been appointed to the Superintendency of the Montgomery (Ala.) gas works.

SOME time ago we had occasion to say that Mr. Samuel Fowler, because of rapidly failing health, peremptorily refused a re-election as Treasurer of the Westfield (Mass.) Gas Light Company, and now we are sorrowfully obliged to report that he passed out of this life, on the evening of July 31st. Through the kindness of a Springfield correspondent we are enabled to furnish the following particulars related to his life: "Samuel Fowler, son of James and Lucy Douglas Fowler, was born in Westfield, November 16, 1820. In 1834 he entered Yale College (being only 14 years of age, and the youngest member of his class), from which he graduated in 1839. The next two years of his life were spent in European travel, and on his return he studied law, and was, in 1846, admitted to the bar. At this stage he was beset with lung hæmorrhage, but another two years of foreign travel happily restored him to health. Upon his return to Westfield (1848) he married Sarah M., a daughter of Samuel Jones, of Stockbridge. From this union resulted a family of four sons and one daughter, of whom the widow, three sons and the daughter survive. The fourth son (Gilbert) who bid fair to attain high grade in the United States Navy, in which service he held the rank of a second lieutenant, died at La Spezia, Italy, in 1874. Mr. Fowler did not engage actively in the practice of the lawyer's art, chiefly because of his delicate health. He did not, however, play the part of a drone, much of his time being occupied in study and in perfecting plans for the advancement of his native town. In 1868 he convinced some of his neighbors that Westfield ought to have a gas works, and by their efforts (although Mr. Fowler should possibly have the sole credit) this want was speedily satisfied. He served as its Treasurer for many years, but a few months ago retired from the position. He served for many years as Chairman of the Westfield School Committee, for two terms as Assessor, and at the time of his death was President of the Westfield Savings Bank (he was one of the organizers of the first savings bank promoted in Westfield), one of the Trustees of the Westfield Academy, and a Director in the Westfield Athenæum and the Hampden National Bank. He was instrumental in organizing a Company to introduce water into the town from the present source of supply, the rights of which Company have since passed to the town. He was one of our most influential and respected residents, whose loss will be sorely felt by us. Although his last illness was tedious, agonizing and hopeless, he bore all its pangs with fortitude and resignation."

ON the 5th inst. Mayor Fitler affixed his signature to the contract between the Philadelphia Gas Improvement Company and the city of Philadelphia, under which the latter is to be partially supplied with gas by the former—3,000,000 cubic feet per diem. The Company will immediately enter upon the erection of the necessary apparatus, which is to be in working order on or before December 31st.

It seems to be a pretty hard matter to induce the members of what is known as the St. Louis Gas Commission to come together, Perhaps it is too warm there just now. At any rate the Commissioners—the Chairman of the Ways and Means Committees of the Council and House, the Mayor, the Comptroller, the President of the Board of Public Improvements and the Street Commissioner—were to have had their first meeting (for the purpose of examining into the feasibility of purchasing the plant and franchises of the Laclede Gas Light Company in 1890) on the 1st inst. Acting Mayor Allen and Chairman Bakely, of the Ways and Means Committee, were the only representatives to appear at the time designated, and when both gentlemen had delivered themselves of some sarcastic allusions to the indifference of others in the matter of grave and important public business, an adjournment was ordered.

Messrs. Swain and Gates, of San Luis Obispo (Cal.), have under consideration the subject of forming a Gas Company for Paso Robles. If they carry out their present intention a crude petroleum gas will be supplied. Paso Robles is noted for its hot springs.

Supt. Cowdery, of the Jackson (Miss.) Gas Light Company, having made up his mind that more gas should be sold in Jackson, has determined on a vigorous course, which includes a persistent house-to-house canvass among its features. Of course, there would not be any great advantage in doubling the number of names on the consumer's ledgers, unless adequate provision in manufacturing facilities was arranged for; but Supt. Cowdery's plan of campaign also includes this essential feature. The retort house is being equipped with improved firing apparatus, the storage capacity has been increased, and the main system has been overhauled. In fact no detail has been lost sight of to insure success. The authorities of Jackson, however, seem to be singularly remiss in the matter of extending the public lighting arrangements of their city. Jackson is said to be ambitious, in that it craves a larger growth; and we would drop a hint to the powers that be that 50 new gas posts might add not a little to the attractiveness of Mississippi's capital city.

Brooklyn, N. Y., is governed by the rarest group of officials possible to find. We have often had occasion to refer to the inadequate and extravagant sort of electric lighting furnished—by the ring—to the people of the city; and if the "half arcs" (at 50 cents each per night) there supplied were in reality only "quarter arcs" a year ago, they certainly are no better than "one-eighth arcs" now, with a tendency to steadily diminish from the weak point of to-day. There is, however, quite a fruitful field which yet remains untouched by the Cooper-Delmar-Shevlin electric light suppliers; but with longing eyes and itching fingers, which seemingly will no longer remain satisfied without possession, they are evidently about to attempt the capture of the remaining acres. The public buildings are lighted by gas, and as many hundreds of thousands of feet of that illuminant are annually consumed therein, the payments for the service, were electricity instead of gas employed, would naturally form a desirable addition to the treasury of the "combination." One of the tools of the "ring"—Supervisor-at-Large Quintard—who, by the way, seizes every opportunity to pose as a public benefactor and a tried and true reformer besides, recently handed in a characteristic document to the Board of Supervisors, the most interesting and meaty portion of which is appended: "In a com nunication to the Board, presented at the meeting of May 27, 1886, I called attention to the enormous charges for gas at the County Jail, which were then running from $6,000 to $7,000 per year. I did not believe that this amount of gas was actually consumed there, and I again remind the Board of the fact that the gas bills for the jail aggregated $8,000 for 1887, and, judging from the rates for the first half of the present year, the gas companies evidently intend to pile it on to the county to the tune of nearly $10,000 for 1888. At various times, both in person and by proxy, I have, at all hours of the night, observed the consumption of gas, and I am sure that any intelligent citizen who will take similar trouble can only arrive at the same conclusion—that, considering the county pays but $1.50 per 1,000 feet, it is impossible to believe that these enormous bills for the jail are legitimate. Apparently, however, we have no redress, for if your honorable body holds back the bills or refuses to approve them, you will be met with testimony to the integrity of the meter, charged with sinister motives, and with contemplating a 'strike' upon the immaculate gas companies, or with having no bowels of compassion for the 'poor widows and orphans' who own the stock. The former Sheriff" (an ex-fireman—and a good one—knew as much about a gas meter as he did about the actual management of the Sheriff's office; for it was well known that the Willoughby street syndicate allowed him a yearly salary, while they raked in the balance, or about 60 per cent. of the emolument pertaining to the position) "told me that, in his opinion, the examination of the meter by the Company's inspector was a mere farce; and the Chairman of the Finance Committee, the Hon. Jno. L. Ryder, of Flatlands"—who is a farmer in a village where kerosene oil and candles are the only artificial illuminants—"also informed me that he had long been impressed with the belief that the charges for gas at the jail were largely in excess of the actual consumption, but that he had failed to devise any actual check, and so had been obliged to certify to them, while morally convinced that they were overcharges. In the communication to which I have already referred I recommended the substitution of electricity for gas as a means of lighting the jail and grounds, and this recommendation, with the hearty concurrence of the Sheriff and his predecessor, I again strongly renew. Probably the *present electric lighting companies will agree to put in the plant and furnish the light on reasonable terms.*" This particular reformer then goes on to say how much better the jail would be lighted by electricity than gas, and concludes his wash-water epistle with a fling at the plumber and his bills. It is a wonder that a man of Quintard's intelligence can for a moment imagine that the taxpayers of Brooklyn are to be deluded by such clap-trap as that which we print above; and it is still more wonderful that he should, for the sake of simple bombast, in effect charge the officials of Brooklyn's Gas Companies, than whom no more reputable or responsible men are to be found in the city, with nothing less than thievery. The italicized words in the closing sentence of his message, plainly reveal the leading animus of its compiler. The Shevlin-Delmar electric current providers covet the full pound of flesh; and Mr. Quintard will evidently aid them in its procurement.

Supt. Gerdenier, of the Bridgeport City (Conn.) Gas Company, has his time fully occupied in looking after the extensions (these amount to a virtual rebuilding of the apparatus and works) now in progress. Mr. J. P. Whittier is the principal contractor for the work; but, as before noted in our columns, the sub-contracts include those granted the American Meter Company for a new station meter, and Messrs. Floyd & Sons for purifying boxes, etc.

The proprietors of the Santa Barbara (Cal.) Gas Company, having purchased the stock of the local electric lighting Company, will hereafter operate both systems. Mr. J. P. Redington has been elected President of the consolidated enterprise. It should be said that the latter is now known as the Santa Barbara Light Company.

Mr. Geo. T. Barr, who is acting as Receiver of the insolvent Mankato (Minn.) Gas Light Company announces that, by virtue of a legal decree, he will, one week from to-day, sell at public auction, to the highest cash bidder, the franchise and entire apparatus of the Company. The sale is to be made subject to a bonded indebtedness of $35,000 with interest on same from first day of January, 1888. The auction will be held, at 10 A M. of the day noted, in the gas works office. Parties intending to bid must deposit $500 in cash (prior to the opening of the sale) with the Receiver, said deposit to be returned to the unsuccessful bidders at the close of the sale. In case the successful bidder eventually fails to complete his contract, which must be formally approved by the Court that ordered the sale, his deposit shall be forfeited.

The Seattle (Wash. Ter.) Gas Light Company has awarded a contract to Otto Ranke for the construction of a new retort house. Seattle is looking up.

It appears that some common sense is still manifested in the Indianapolis (Ind.) City Council, although we must confess it looked at one time as if "non-sense" was to carry the day. In any event the joint boards of Council and Aldermen, after wrestling some time with the question of renewing the contracts for public lighting, finally agreed upon a compromise. The electricians made strenuous efforts to capture the plum, pit and all, although they fell short of obtaining the full measure of their desires. The Committee that had the matter in charge recommended that the Brush Electric Light Company be authorized to locate and maintain 100 arc lights in the business portion of the city, to burn each night and all night, at its bid price of $60 per annum. Also that the proposition of the Brush folks to furnish other lights at any point within the city limits (on a 2,500-hour schedule, at the rate of $81 per annum) be accepted. The Committee next recommended that the Indianapolis Gas Light and Coke Company be authorized to light all gas lamps now in use within the city limits, and such others as may be ordered or added from time to time, at the rate of $15 per post per annum, the city to reserve the right to extinguish such number of lamps as in its judgment may be replaced by the 100 Brush arcs. The Company also to

furnish gas to the public buildings at the rate of $1.25 per thousand. The contracts are to expire on December 31, 1890. The bid of the Jenny Electric Company was given no attention.

CERTAIN would-be benefactors of Evansville, Ind., organized a Company, which was baptized the Citizens Electric Light Company, and then its promoters applied to the City Council for a franchise and a contract. It seems, however, that it is not destined to reach much further than the baptismal stage, at least as far as a city contract is concerned. We reach this conclusion from having learned that, at a recent meeting of the Council, the Citizens Company was denied the "right of way," and that appears to carry with it a sad blow to the Company's contract hopes. In order to still further discomfort the benefactors, the Evansville Gas and Electric Light Company, through President Reitz, has announced that, from 1st inst., ordinary consumers are to be supplied with gas at the rate of $1.50 per thousand, while the city is to be supplied at $1. The former schedule called for $2 and $1.50. That is the way to punish the benefactors—that is, of or to themselves.

BROTHER BAXTER, of Evansville, has devised a decidedly effective method of advertising the effectiveness and salubrity of gas stoves. If you care to examine it for yourselves, ask him to send you a copy of the local papers containing the picture of the man "who knows it is hot."

THE city authorities of Newark, N. J., have awarded a contract for the supply of gas lamp posts to Messrs. Maher, Robinson & Flockhart. Their bid was $5.12 per post. The Gardiner Lamp Manufacturing Company received the contract for lamp frames, at their offer of $1.45.

IT is said that the United States Electric Lighting Company of this city is under contract to install a complete spec men of its plant in the custom house at St. Louis, Mo. The building had been partially lighted by electricity. The work will cost the Government $25,000; and it is expected that everything will be in readiness by Jan. 1. Our informant adds: "The chandeliers and burners will be retained, as a measure of precaution."

WE understand that a reduction in rates will shortly be announced by the Jamaica Plain (Mass.) Gas Company.

CERTAIN speculators assert that they will soon be in position to deliver (each 24 hours) one or more millions cubic feet of natural gas to Louisville, Ky. At what retail rate do they propose to sell the natural product. In the meantime Engineer Barret, of the Louisville Gas Company, is quietly searching after a process that will enable him to manufacture and *supply* a good artificial fuel gas.

Natural Gas and the Brine Wells of China.

Consul Denby, of Peking, explains that to make a well (natural gas is found in several Chinese provinces) the Chinese use a long and elastic bamboo pole, supported in the middle by a crosspiece, a rope made by coupling the ends of long pieces of bamboo, and an iron instrument which weighs about one hundred catties—the catty being equivalent to one pound and a third avoirdupois. The rope is fastened on the thin end of the pole, and the iron on the end of the rope. A slight up-and-down motion of the thick end of the pole makes the iron bore a vertical hole with its broad sharpened edge. The ground to be bored consists chiefly of sandstone and clay. When a portion of the rock is crushed clear water is poured into the hole, a long bamboo tube with a hole in the bottom is lowered, and the turbid water raised to the top. Pipes of cypress wood are rammed in to protect the sides of the bored hole, and to prevent the water contained in the surrounding ground from gaining access to the well; the pipes are attached to each other at the ends with nails, hemp, and tung oil. The inner width of the pipes is about five inches. As the work proceeds the pipes are rammed down, and a new one attached on the top; the rope, too, is made longer. At a depth varying from seventy to one hundred chang (from seven hundred to a thousand feet) the brine is struck and the well is fit for use. The brine is raised to the top through long bamboo tubes and bamboo ropes, and then carried to large pans for evaporation, or led to them through bamboo pipes.

Besides these wells there are others which are bored to a depth of from eighteen hundred to two thousand feet. At that distance below the surface petroleum is struck. Immediately on reaching it an inflammatory gas escapes with great violence; work is now stopped, and a wooden cap fastened over the mouth of the pit, perforated by several rows of holes. In each of these a bamboo pipe is inserted, and through these the gas is led into the evaporation pans. The pipes ramify, and on each end a tapering mouthpiece, terminating in a small aperture, is attached; the gas is then used for evaporating the brine.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

The Merits of the Connelly Governor.

THE EAST RIVER GAS LIGHT COMPANY,
LONG ISLAND CITY, N. Y., August 2, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

During this season I have had an opportunity to make some tests as to the value of the Connelly Automatic Governor, at the same time proving the incorrectness of the theory advanced by some of our gas engineers, especially those of large works, who, in conversations had with me heretofore, said that the governor was only good for small works and not for large ones, for the reason that in large works and over long distances it would not act with sufficient promptness to be on hand with the supply (when the consumer would need it) at the extreme end of their mains—particularly when the out-put was large—carrying the idea that the pressure, being tardily applied, would always remain deficient during the service of that night's lighting. Of course I held directly the opposite views in all such conversations, and resolved that when I did have an opportunity I would prove this beyond a doubt. This season I have had occasion to lay some 6 or 8 miles of new mains, at distances quite remote from the works, and so have had, when clearing the pipe from air, opportunity, as stated before, of making the test. The pipe, through which the gas was passed from our works during the test, in this instance, consisted of 510 feet of 16-inch main, 5,694 feet of 12-inch main, 7,984 feet of 8-inch main, 2,642 feet of 6-inch main, or a total of 16,830 feet of main—all being in a direct line away from works—at the end of which was placed a 6-inch valve. To ascertain if the governor was prompt and satisfactory in its action, a man was stationed in our meter room to take the state of the meter, at the beginning and end of the test, as well as the exact height of the holder, and to observe the working of the governor and to report the differences in the pressure attained at the gas house during the time of said test. The party stationed in the meter room did not know the minute that the valve would be opened at the extreme end, and, therefore, could not fix any figures. Our watches were set exactly alike. The minimum pressure in our mains in the day time is 14-10ths, the maximum pressure at night is 34 10ths, all of which is taken care of entirely by the governor (a 16-inch one) without any attention whatever. I append below a table of the pressure, or a memorandum showing the action of the governor itself. During the time occupied in making the test (4:05 to 4:40 P.M.), you will see that at 3:55 P.M. the pressure was our ordinary day pressure, and remained so until 4:5½ o'clock, at which time the governor opened full, and at 4:8½ had attained a pressure of 26½ tenths. I commenced to open the valve at the end of the line exactly at 4:05 o'clock, it taking some time, as you may know, to open the 6-inch valve—and it was not like opening the whole diameter instantly—yet within one-half of a minute the governor had opened wide to give the pressure which would be required by consumption of that amount. By comparing the table, hereto annexed, you will see the following pressures attained every few minutes, as also the operation of the governor. The volume and pressure, and consequent different motions of the governor, were caused by occasionally placing our hands over the mouth of the 6-inch valve, to, in a measure, test the volume by the sense of feeling, which, in every case, was immediately acted on by the governor. You will also observe that the maximum amount of pressure obtained in this instance was only 30-10ths, instead of 34-10ths, showing that the volume required to supply the 6-inch opening, at that distance from the works, only required that amount—30-10ths—instead of the maximum pressure maintained during the night by the excessive consumption. I think the Connelly Brothers are entitled to considerable praise for furnishing the gas fraternity with so delicate an instrument, and I fail to comprehend how any man, located at a set of works, can ascertain the exact time when gas may be required, and do by hand what this instrument does of its own accord—for meeting at all times the demands without fail. It would be utterly impossible for any one to calculate at what time a certain quantity of gas might be required. The governor, while maintaining a 14-10ths pressure during the day, will change its volume oftentimes, and yet maintain the day pressure. The same may be said of the night pressure,

the volume increasing and decreasing; and yet the maximum pressure decided upon is always attained, no matter what volume is required, provided it does not go below the amount that causes the change.

On Sundays the pressure is one inch less than on week days, and on sunny days, as well as on stormy or rainy ones, the governor can always be relied on, as it promptly furnishes the amount of gas required by the people in proportion to the demand. Our governor has been in use for the last three years, and has required adjustment but twice; beyond that we never have had to handle it. In conclusion, I would add that the holder pressure behind our governor—which is always on full—is 54-10ths, the minimum pressure on the street being 14-10ths, while the maximum is 34-10ths. Yours truly,

CHAS. A. KITTLE, Secretary.

Record of Pressure, in Tenths of Inches.

At 3:55 o'clock,	14	At 4:12 oclock,	20	At 4:25 o'clock,	24
" 4:05½ "	16	" 4.12½ "	24	" 4:30 "	29
" 4:06 "	19	" 4:14 "	26	" 4:32½ "	23
" 4:06½ "	22	" 4:18 "	22	" 4:35 "	29
" 4:07 "	24	" 4:20 "	26	" 4:38 "	29
" 4:08 "	25	" 4:22 "	30	" 4:40 "	20
" 4:08½ "	26	" 4:25 "	24	" 4:44 "	14

Action of the Governor.

At 3:55 o'clock,	steady.	At 4:22½ o'clock,	closing slowly.
" 4:05½ "	opening full.	" 4:25 "	opening slowly.
" 4:08½ "	closing slowly.	" 4:30 "	closing slowly.
" 4:12½ "	opening slowly.	" 4:32½ "	opening slowly.
" 4:16 "	steady.	" 4:40 "	steady.
" 4:18½ "	opening slowly.		

Johnson Jay Jay's Supremacy Threatened.

PERU, INDIANA, August 4, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

I send you, under separate cover, a copy of the Chicago *Herald*, of August 1st, in which I have marked certain paragraphs for your perusal. Knowing how great your interest is in all new processes for the manufacture of gas, and feeling sure you had not heard of this latest one, I venture to send the *Herald* man's account of it for your information. You will notice this expert comes pretty well up to the claims of the "bbl.-of-oil man"—with the exception of the lubricants.

I cannot imagine what the superintendents and engineers of gas companies are doing when they allow so many (who do not profess to be experts in the business) to get ahead of them in the production of cheap gas. I am of the opinion they might better turn editors of papers for a time, and then, perhaps, they would learn some new and cheap method of producing gas.

I am, dear sir, not the editor of the Chicago *Herald*, but merely a poor SUPT. OF A GAS COMPANY.

[The article in the Chicago *Herald*, to which our correspondent alludes, is in the regular style of the journalist who, without the slightest practical, and with a mere modicum of theoretical knowledge concerning gas manufacture, calmly sets out to explain how Mr. So-and-so is on the verge of revolutionizing the gas-maker's art. The Chicago man introduces his subject with a description of the plant at the south Chicago end of the Standard Company's pipe line from the Lima oil fields, and having thus warmed to his subject, he proceeds to tell how the gas business is to be revolutionized. Using his own words, the revolution is to be accomplished in the following manner:

"But that is not all the scheme. There is a bigger thing behind it that is slowly developing at this time that threatens a revolution in both the fuel and the illuminating lines. In April last an ordinance was introduced in the City Council empowering the Chicago Fuel and Light Company to construct gas works and lay mains for the purpose of carrying manufactured and natural gas through Chicago for light, fuel, heating and power purposes. On May 12 the Committee on Gas reported this ordinance, and recommended that it be placed on file. It was taken from the files and again referred to the same committee and reported upon favorably just before the City Council adjourned for its summer vacation, so that it will come up for passage when that body meets again, and stands a good show of becoming a law. The ordinance was sent in by Charles W. Colehour, who, with his family, at present resides at the Southern Hotel, and is the owner of the Colehour tract at South Chicago. He is not connected with the Standard Oil Company, but he represents five Eastern capitalists whose combined fortune is estimated at over $50,000,000. This company owns 32,000 acres of land in the Western Indiana natural gas fields, from which it proposes to pipe gas to Cook County, not only for use in Chicago, but Hyde Park, Lake, Lake View, and all the towns and villages roundabout where there would likely be a sufficient demand to pay for the investment of the capital. Sections 10 and 11 of the ordinance introduced in the Council are as follows:

"SECTION 10.—The rights and privileges hereby granted are upon the express condition that no gas flowing through any main pipe, feeder, or service pipe laid by said company or corporation, or by its authority, shall be charged for more than $1 per thousand feet for gas for illuminating purposes, nor more than 40 cents per thousand feet for gas for heating, fuel, or power purposes, with a rebate of 20 per cent. on said above prices in case of payment on or before the 12th day of the month next succeeding that in which such gas is furnished, and to attempt to collect at a greater rate than that herein specified for gas consumed from any such main pipe, feeder or service pipe, shall work a forfeiture of the rights and privileges hereby granted. *Provided*, the right is expressly reserved by the city of Chicago to fix the price and charge to be paid by any consumer of any other substance other than gas said company may furnish through its said pipes for lighting, heating, power or fuel purposes, and which shall be done by ordinance, and in accepting this ordinance said company shall expressly consent thereto.

"SECTION 11.—In the event that such company or corporation, within three years from the date of the passage of this ordinance giving it permission to lay its main pipes, etc., shall not have built and completed gas works in said Cook County sufficiently extensive to enable it to manufacture and distribute gas to any amount not less than ten million feet in every thirty days, and located within the limits of Cook County, and shall not have commenced such works, and expended thereon at least $500,000 within eight months from the date of the passage of this ordinance, or if such company or corporation shall at any time enter into a combination, directly or indirectly, with any gas company or companies concerning the rates (or price) to be charged for gas either to the city or private consumers, or if such company or corporation shall directly or indirectly sell, lease or transfer its franchises and privileges to any other gas company or corporation, or if such company or corporation, having commenced to manufacture gas, shall cease for a period of more than ten consecutive days (unless by reason of unavoidable accident) to furnish gas through its pipes, the rights and privileges hereby granted shall cease and be of no more force or effect, and it shall not require the judgment or decree of any court of law or equity to determine the said rights or privileges, but the same shall wholly cease and determine absolutely and at once, upon the happening of any of the matters or things in this section specified.

"It will be noted that this ordinance proposes to furnish gas at 80 cents per 1,000 cubic feet for illuminating purposes, and 32 cents per 1,000 cubic feet for heat, power and fuel, figuring, of course, the reduction for the prompt payment of bills.

"It is a well-known fact that natural gas is not a good illuminator unless it is carbonized, and for this purpose oil gas will be used. This can be easily and very cheaply made and by a very simple process. It is for this purpose that the immense tankage capacity is now being constructed at South Chicago. A gallon of crude oil will make 1,000 cubic feet of carbon gas, which is so rich as to be equal to about 4,000 feet of ordinary hydro-carbon or other manufactured illuminating gas. The oil costs a half cent a gallon to bring to South Chicago, and one cent more to turn it into gas. In other words, 40,000 cubic feet of gas can be made from a barrel of crude petroleum for 60 cents. The process is very simple. A retort is constructed, in which there are coils of pipe, somewhat similar to the coils of a worm in a distillery. The oil flows into these coils from the tanks outside, and the heat transforms it into gas, which is passed through water, purified, and then through pipes into a holder. It is then ready to mix with natural gas, and will be so used.

"If the ordinance is passed by the Council, the work on this new enterprise will be continued through the winter. The Company will not tear up the streets, but lay immense mains in tunnels under the streets, somewhat upon the same plan as the conduits for electric wires are now laid, except that the streets will not be opened, but the tunnel will be a brick archway, with manholes, in which the pipes will lie loosely, and can be used for other purposes if the city should deem it necessary."

Now, since there is great rivalry between the Chicago newspapers, it might be a wise move to wait until the gas experts on the Chicago *Tribune* are heard from. We fear, however, that the *Herald's* genius has made out a very hard task for his esteemed contemporary; for 40,000 cubic feet of gas from a barrel of crude oil, produced at a total cost of 60 cents, is a result which, beyond a doubt, must be placed a good second to the Columbiana "bbl. of oil" man's first.—ED.]

Gas for Locomotives.

The Philadelphia *Record* says that the problem of obtaining a cheaper fuel than coal for locomotives, which has long bothered railroad men, seems likely to be solved soon by experiments now being made with gas. A very good test of the new fuel has been made at the works of the Electric Light Company in West Chester, which, since the fire that destroyed the old plant several months ago, have been dependent for their motive power upon the Shaw locomotive. This is the engine that made such a good record in some trial trips two or three years ago, but which has never done much road service.

Instead of coal, gas mixed with air has been used in the locomotive with entire success in generating sufficient power to drive the dynamos. With larger machines for producing and mixing the gas it is believed that power enough can be obtained for driving locomotives with trains, and a special car is now being built at New York to hold a large machine of the kind used in mixing the gas and the storage receivers. This will be attached to a locomotive, and tests will be made soon, probably on the main line of the Pennsylvania railroad, or the short branch line from West Chester to Phœnixville. The experiments at West Chester have been made under the direction of Jackson Richards, who has recently been restored to his old position of Master Mechanic of the Reading Railroad's Norristown, Germantown, North Pennsylvania and Bound Brook lines, and Mr. Richards is sanguine of the success of the new fuel. The gas and air are mixed in a machine called the Caloric King, the invention of Rev. Ballard S. Dunn. In a report upon its workings Mr. Richards says:

I am satisfied in my own mind that if machines large enough for locomotives are built, with a reserve power, it will be a great advantage and saving to burn gas as fuel for railroad purposes. Having some 30 odd years' experience in the construction and management of locomotives, I can speak with confidence on the subject. I claim, in the first place, that the saving in burning gas instead of coal will be very great; for with the present system but about 45 per cent. of the fuel is used, 55 per cent. going to waste, while with Caloric King to commingle the gas and air the combustion is so perfect that nothing is lost. To illustrate my meaning it is only necessary to state the fact—well known to gas manufacturers—that one ton of coal will make about 11,000 feet of gas, which gas commingled with air and burnt through the Caloric King, will do more railroad work than any two tons of coal, besides giving the Company an additional profit from the sale of coke.

The next saving, resulting from taking off the back pressure, amounts to 20 per cent., while doing away with the disagreeable noise of the exhaust, adding this strength to the engine. Another advantage to railroad companies is the doing away with all smoke, soot and cinders, thus saving the heavy damages that companies annually pay for property destroyed along their lines.

The Latest Move at Evansville, Ind.

In our item columns will be found a report of a meeting of the Evansville City Council, at which an application made by a competing company for a franchise was denied. The promoters of the opposition it seems propose to fight the matter out in the courts, as will be seen from the following, forwarded us by a correspondent:

"The Evansville Citizens Electric Light Company, which was recently denied a franchise by the City Council, has applied for a mandamus against the Evansville Gas and Electric Light Company. Plaintiffs also implead the Council in the application, in which they urge that the municipal legislature has no constitutional right to clothe any corporation with exclusive privileges, and that the Evansville Gas Light Company, which is now made a monopoly, has no legal right to the streets of the city to the exclusion of other companies. The Supreme Court has just handed down a decision in another case which very emphatically denies such rights to a municipality, and it is upon the strength of this decision that the new Company is proceeding.

"The question raised has many interesting phases, and involves the rights of numberless corporations in the State. It will be conducted by some of the most noted lawyers in the West, and the result will be looked forward to with keen interest.

CERTAIN parties are largely interested in bearing Laclede gas stock just now. We would say to those who purchased it on our advice that the Company is in better shape at present than it ever was before. Its output is steadily increasing, and the grand scale on which the betterments are being carried out on the plant shows the faith of its managers in the future. That holder is going up just where Captain Keiser said it would. The tank was finished a fortnight ago, and the Shickle, Harrison and Howard Iron Company will send the iron work right along.

HINTS FROM MACON GA.—The Jeter-Boardman Gas and Water Company has secured the contract for building the water works at Cartersville. The Company, under the provisions of the franchise, obtained a 30-year agreement with the authorities, who are to pay at least $2,500 per annum for a public hydrant service. The Company has just completed the water works at Brunswick, Ga., and is busily engaged on similar plants at Tampa and Ocala, Fla.; Tuscaloosa, Ala.; Sumter, S. C.; to which must be added the Cartersville venture. Despite this mass of business the spry Mr. Boardman still manages to keep the Macon Gas and Water Company up to the best state of efficiency. Some time ago he announced that the Maconites would not find it necessary to apply to the opposition management for a supply of cheap gas, because when the philanthropists were ready for business he would also be there to meet them. And so he was, for on the 1st of August the old Company reduced its selling rate to $1 per thousand cubic feet.

The Market for Gas Securities.

The increase in market value of Consolidated shares which became rather pronounced something like three weeks ago was held firmly during the fortnight. The stock touched 80 and a fraction since our last market report, and brokers are of the opinion that the majority of transactions were effected for investment account. A certain return of $4 per annum on an investment of $80 per share speaks for itself. To-day (Aug. 14) the stock sold at 80, and this verifies our prediction of a fortnight ago. Those who watch the market closely assert that Mr. Cammack, usually a bear on the general market, but always a bull when it comes to Consolidated, has made large purchases of Consolidated within the last three months, and the Messrs. Wormser (who act for European investors) have also been quietly picking up these shares. We do not advise the purchase of Consolidated for speculative purposes, but urge its value upon the attention of investors. Within 5 years' time this stock will be returning at least 6 per cent. on its par value, and no combination of circumstances can upset its stability. Mutual is stronger. Other city shares are about as before. Brooklyn stocks show no change in values; although if anything these securities are stronger than at time of last report. Consolidated, of Baltimore, advanced quite sharply, being now rated at from 52 to 53. Chicago Trusts are weaker, and are quoted at 32½ to 34. Investors will not likely care to dabble in this stock, unless they do so for a gamble. Interested parties have tried to bear Laclede gas of St. Louis, Mo.; but holders should pay no attention to all the bear talk indulged in. Laclede is worth more now than it was a year ago. The general situation is all in favor of the shareholders.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 WALL ST., NEW YORK CITY.

AUGUST 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	79⅞	80
Central	440,000	50	—	60
" Scrip	220,000	—	47	57
Equitable	4,000,000	100	110	112
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	118
Mutual	3,500,000	100	92	95
" Bonds	1,500,000	1000	101	103
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	—	80
Richmond Co., S. I.	300,000	50	55	60
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	102	105
Citizens	1,200,000	20	50	55x
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	133	135
" Bonds	300,000		—	106
Peoples	1,000,000	10	70	72x
" Bonds (5's)	368,000	—	97	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	80	82
Nassau	1,000,000	25	102	105
" Ctfs	700,000	1000	98	100
Williamsburgh	1,000,000	50	122	125
" Bonds	1,000,000	—	111	112
Out of Town Gas Companies.				
Boston (Mass.) Gas Co	2,500,000	500	200	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	208	215
" " Bonds	45,000	—	—	—
Chicago Gas Trust	25,000,000	100	32½	34
Cincinnati G. & C. Co.	6,000,000	100	179	180
Consumers Toronto	1,000,000	50	192	—
Central, S. F., Cal.			—	84
Capital, Sacramento, Cal.			58	—

Consolidated, Balt.....	11,000,000	100	52	—
" Bonds.....	6,400,000		107	107½
Hartford, Conn.....	750,000	25	—	138
Jersey City.....	750,000	20	165	170
Laclede, St. Louis, Mo.	2,000,000	100	115	117
Louisville, Ky.....	2,570,000	50	125	130
Little Falls, N. Y.....	50,000	100	—	100
" Bonds	25,000	—	100	103
Montreal, Canada.....	2,000,000	100	210	214
Memphis (Tenn.) Gas...	750,000	100	48	51
" Bonds.	240,000	100	103	—
New Haven, Conn.....		25	193	197
Oakland, Cal.....			32½	33½
Peoples, Jersey City...		—	60	61
" " Bonds..		—	—	—
Paterson, N. J.....		25	90	—
Rochester, N. Y.....		50	75	80
Syracuse, N. Y.....	500,000	25	—	—
St. Louis, Missouri.....	600,000	50	—	—
San Francisco Gas Co.				
San Francisco, Cal....	10,000,000	100	54½	55
Washington, D. C.....	2,000,000	20	200	201
Wilmington, Del.....		50	200	208
Havana (Cuba) Gas Co.	3,000,000	100	18	20
" Bonds....	550,000		102	—

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Persons desiring to bid at such sale upon said property will be required to deposit with the undersigned, prior to the opening of said sale, the sum of $500 as a guarantee of the good faith of their bid, and that in case the property shall be stricken off to them upon their bid they will proceed to close up the purchase and pay the remainder of the purchase price upon such sale being confirmed by the Court, or forfeit said deposit. To all other bidders except the purchaser at such sale said forfeit money will be returned at the close of such sale. Said sale will be made subject to the approval of the Court, and immediately upon the same being confirmed a due and proper transfer of said property will be made.

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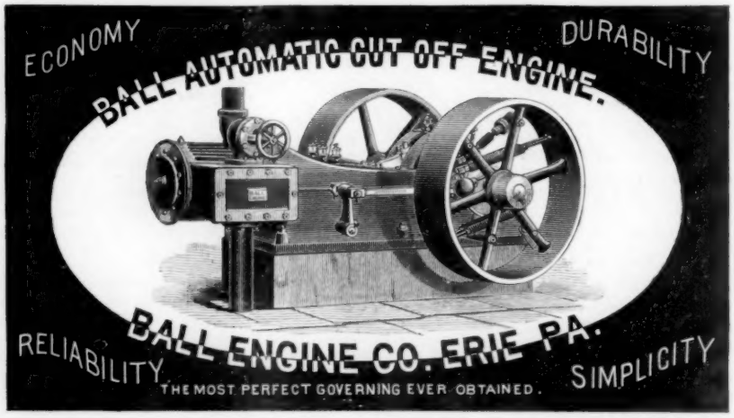

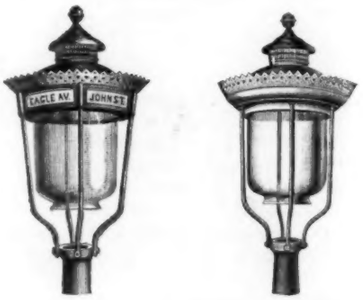

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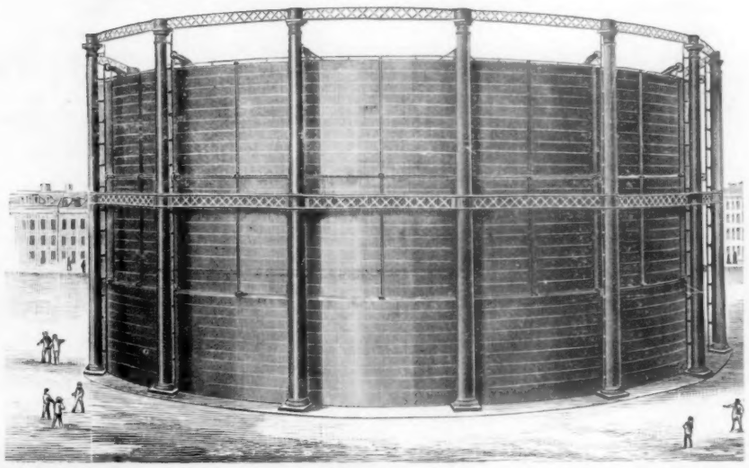

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The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys, Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers

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The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus, and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

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JOHN H. McELROY, Engineer.

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OFFICE COLUMBUS GAS LT. AND COKE CO., COLUMBUS, OHIO, October 14, 1887.

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Yours truly, E. McMILLIN, V. P. & Gen. Mangr.

GEORGETOWN, D. C., Sept. 27, 1887.

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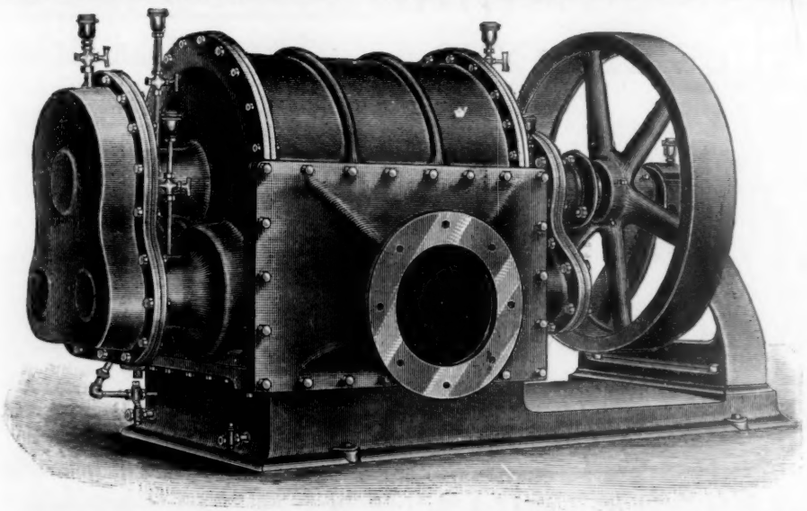

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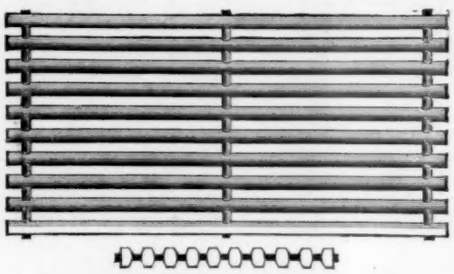

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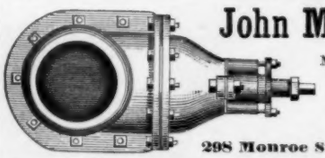

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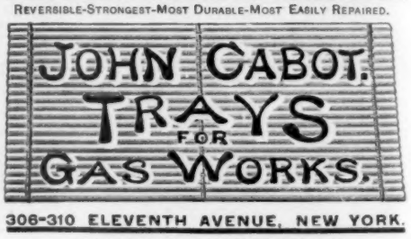

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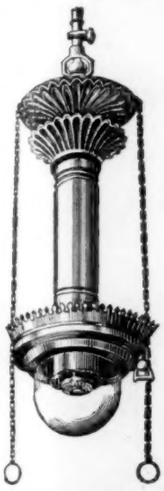

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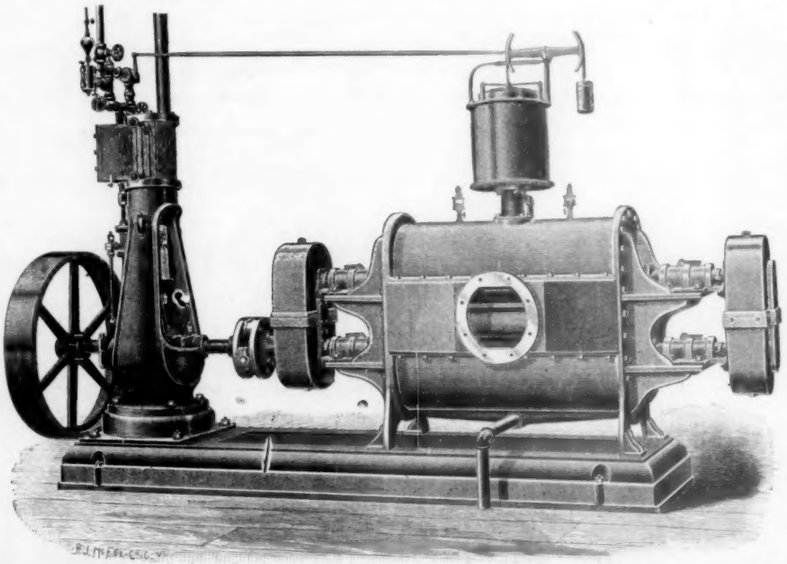

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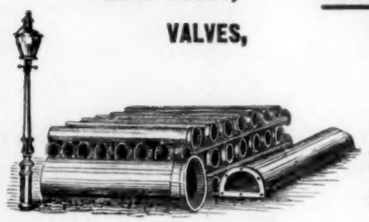

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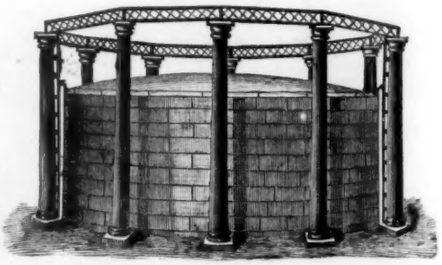

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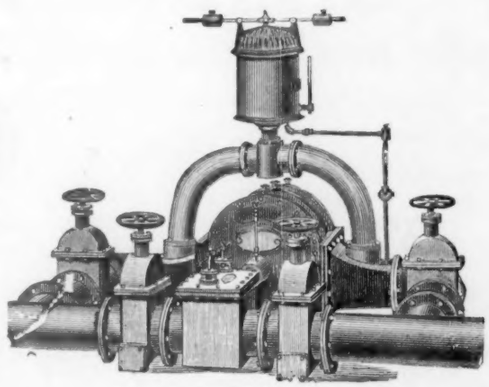

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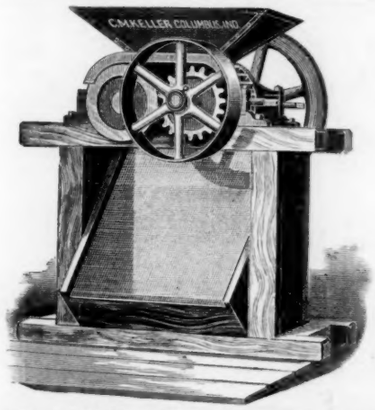

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50-H.P. STEAM ENGINE AND BOILER, Running a Plant of Fifty 2000-C.P. Arc Lamps 12 Hours.	
4,500 lbs. Indiana nut and slack, at $1.30 per ton	$2 93
Engineer, one night, at $50 per month	1 67
Trimmer, one day, at $40 per month	1 33
Superintendent or Electrician, one day, at $50 per month	1 66
Waste, etc., one day, at $20 per year	05
Water rent, one day, at $40 per year	11
Wheeling coal and removing ashes, at $4 per week	58
100 pairs carbons, at $18.50 per 1000	1 85
One pint cylinder oil, at 60 cents per gallon	07
One quart engine and dynamo oil, at 50 cents per gallon	13
Total	$10 38

50-H.P. OTTO GAS ENGINE, Running a Plant of Fifty 2000-C.P. Arc Lamps 12 Hours.	
9,200 cu. ft. gas, at 42 cts. per M. (for cost of gas see items below)	$3 86
Engineer not needed; engine is in care of Electrician or Supt.	....
Trimmer, one day, at $40 per month	1 33
Superintendent or electrician, one day, at $50 per month	1 66
Waste, etc., one day, at $20 per year	05
Water rent dispensed with (cooling water used over and over)	....
Handling of coal included in cost of gas	....
100 pairs carbons, at $18.50 per 1,000	1 85
One pint cylinder oil, at 60 cents per gallon	07
One quart engine and dynamo oil, at 50 cents per gallon	13
Total	$8 95

Expenses of depreciation, repairs, and interest omitted, being considered the same in both cases—though depreciation and repairs are much higher with steam on account of boiler and its appurtenances. Cost of gas in the holder we estimate for most of the Middle and Western States as follows: Coal, 30 cts.; labor, 20 cts.; purification, 2 cts.; total, 52 cts. Less coke, 7 cts., and tar, 3 cts.; leaving net cost of gas 42 cts. The items of Superintendence and repairs, being paid for by the gas sold to consumers, need not be charged on extra output for gas engine consumption. Where the cost of gas is higher than here figured, coal for steam use will be found proportionally higher, and final figures of comparison show same amount of saving.

Excess in Cost of Steam over Gas Power is thus $1.43, or nearly 16 per cent.

Coal for getting up steam and banking fires is not included in above figures, and should be added, thus increasing rate of economy of gas power beyond that shown by our figures.

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